FLASHES AND PLUGS

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Contents

IN THE NATION'S CAPITAL 17
By Francis X. Welch

THE SOUTH MEETS GREAT EXPANSION 19

TROUBLE CLEARING—SIGNIFICANCE OF STORAGE BATTERY VOLTAGE—Part 39 21
By L. N. Martin

CARRIER SYSTEMS—Part 6 24
By Harold B. McKay

THE PLANT MAN'S NOTEBOOK 32
By Ray Blain

COURTS AND COMMISSIONS 34

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★ ★ ★ IN THE ★ ★ ★ NATION'S CAPITAL

by FRANCIS X. WELCH WASHINGTON EDITOR

Regulation of telephone industry holds limelight at recent meeting of Section of Public Utility Law during convention of American Bar Association. 83rd Congress has a record accomplishment despite slow start and longest filibuster in history.

THE ANNUAL meeting of the Section of Public Utility Law, held in connection with the national convention of the American Bar Association in Chicago, Aug. 16 to 20, produced its usual quota of interesting commentary on the progress of public utility regulation. While much of the meeting was devoted to consideration of more controversial topics, such as the U. S. Supreme Court's recent decision expanding the jurisdiction of the Federal Power Commission (FPC) to natural gas production, two of the speakers had some significant things to say about the developments in the field of telephone regulation.

Both of these came during the first session of the Section of Public Utility Law, which was in the nature of a review of court and commission decisions, new laws, etc., during the past year. On the panel was a lawyer representing each of the main public utility industries. The telephone business was doubly represented by a Bell System attorney and an Independent company attorney.

The Bell System lawyer was G. Wallace Bates, general attorney of the American Telephone & Telegraph Co. of New York City. He devoted his attention to four aspects of recent telephone rate case practice: (1) The rate base; (2) the rate of return; (3) the compensation for inflationary loss, or so-called "attrition"; and (4) the regulatory lag.

According to Mr. Bates, it can now be said that there is a movement toward making some compensation for inflation in telephone rate cases. He admitted that the movement is not without considerable dissent and resistance. But he added that "when the states which have made such compensation during the past year are added to those which have taken similar action in previous years, the list is impressive." The speaker referred specifically to the action taken during the past year in Delaware and North Carolina joining those states to the column of "fair value" states. "Viewed from the standpoint of the utilities," Mr. Bates said, "the movement seems much too slow and halting."

Why has the movement to recognize economic loss of utility investment due to changing values been so slow? The Bell System attorney indicated that the main reason has been the intrenched precedent or adherence by many of the regulatory commissions to the so-called net investment rate base. There has also been some tendency to rely on mere adjustment of the rate of return to take care of necessary changes in the price level, thereby avoiding the need for altering established views on the rigid cost basis. Mr. Bates said on this point:

"In the past, proponents of prudent investment or original cost rate bases commonly contended that the rate of return could be increased or decreased with changing price levels and that consequently no adjustment in the rate base is necessary. Their contention was that only one factor should be adjusted and not two. Thus, the Federal Power Commission in its brief in the Hope case argued that with fluctuations in the price level, common stockholders may be adequately protected by adjusting the rate of return. While this contention regarding the possibility of adjustment in the rate of return was made by the proponents of prudent investment rate bases before substantial inflation had taken place, most of such proponents have recently been silent on that subject.

"Even though the proponents of a changing rate of return to reflect changing price levels have recently been silent, during the course of the last two or three years we have noticed a tendency for commissions gradually to increase the rates of return allowed in Bell System rate cases. This has been continued in the past year as illustrated by the . . . (certain) cases."

The speaker then referred to commission decisions from Colorado, North Dakota, Oregon, Rhode Island, and California where the rate of return has been drifting upward on a general average. The speaker implied, however, that Bell System companies would continue to carry on their efforts to secure recognition of the need for compensation for lost value in future rate cases, notwithstanding reversals or unfavorable results here and there.

He called by name unfavorable decisions in which the Bell System companies were involved in Michigan, New Mexico, New Jersey, West Virginia, Alabama, and New York. With the exception of New Mexico these were all rulings at the commission level, and the last word has not necessarily been said in view of the distinct possibility of court appeals. The Alabama case, for example, is only now in the process of appeal, and there is considerable speculation about what will now happen in the New York Telephone Co. situation.

On the question of regulatory lag, Mr. Bates states: "During the past year commissions generally have been more prompt than in earlier years in rendering decisions in Bell System rate cases. Several commissions have rendered rate orders within three or four months of the time of filing for new rates. However, while there has been some progress on this score, during the past year we have had one decision which was not rendered until nineteen months after the case was filed."

By way of conclusion, the Bell System attorney recalled that "many commissions and commission staffs have long advocated a net investment rate base, and to some of them the cause took on the form of a crusade. To this net investment rate base they wished to apply a fixed rate of return. I believe it is fair to say that during the early years of the postwar period a number

of commissions and staffs developed a fairly inflexible position in rate cases. By way of contrast, the cases I have cited reflect a disposition of many commissions in more recent cases to take a broader view of the whole economic problem of utilities. It is significant that when such a view is taken, many commissions have concluded that some compensating allowance should be made."

Relation of Service to Rates

The lawyer at the American Bar Association meeting selected to represent the Independent telephone industry was John Robert Jones of the Columbus, O., bar, who is special rate counsel for the General Telephone Corp. system. Mr. Jones devoted his remarks to an interesting trend of recently decided cases on the question of whether regulatory commissions have any right to deny an otherwise justified rate increase because of alleged inadequate or defective telephone service.

Mr. Jones found four cases from four state courts all ruling to the effect that rate relief should be granted where economically justified, regardless of service deficiency claims. It is, of course, within the right of most state commissions to require the correction of service deficiencies upon complaint or otherwise shown to be existing. But these courts have held that the two functions are mutually distinct forms of regulatory authority, which should not be confused in the same proceeding, so that a decision on one point is made to depend upon the other.

The strongest case on this was a decision of the Ohio Supreme Court in the well-known Elyria Telephone Co. case. Since then similar rulings have been handed down by the Florida Supreme Court (Florida Telephone Corp. *v.* Carter, 3 PUR3d 145); by the Michigan circuit court (City of Ludington et al. *v.* Michigan Public Service Commission, 100 PUR NS 170); and by an Indiana county circuit court in a General Telephone Co. case not yet reported.

The only recent contrary opinion cited by Mr. Jones came from the Utah Public Service Commission in a Mountain States Telephone & Telegraph Co. case decided late last December. Mr. Jones also commented on the use of injunction proceedings to set aside alleged confiscatory rate orders by cities or regulatory commissions.

New TV Communication Utility?

The Wyoming Public Service Commission has recently released an opinion of the attorney general of that state on the status of community television antenna service. Such services have been springing up throughout the United States in the wake of the tidal wave of popularity of the TV receiving sets in the American home.

First came a limited form of such service as a result of apartment house rules and other property restrictions against the erection of individual TV antennas by numerous apartment tenants. Unrestricted installations of this type would soon make the roofs of large apartment dwellings an impenetrable, unsafe and unsightly jungle of poles, bars, and wires.

The so-called "master" antenna service (supplying multi-tenant dwelling units) was not generally much of a technical or commercial problem. The real problem arose in mountainous terrain where small hamlets or suburban areas found themselves located in "blind pockets." They could not receive satisfactory television signals without running a lead-in connection for some distance to a strategic high point where the antenna could receive the TV programs without interruptions from intervening terrain. This cost money and called for sharing the expense.

The result was commercial antenna service, which has become quite commonplace. The party or company conducting this service puts up the antenna and maintains it, charging a small fee to all "customers" who want to share the reception through lead-in drop wires.

But a legal question arose. Is this a public utility service? In what seems to be about the first authoritative opinion on the subject, the attorney general of Wyoming has ruled that it is. The ruling came last spring but it has only recently been released. The attorney general, Howard B. Black, referred to various sections of the Wyoming regulatory law defining the status of public utility service.

Of special interest to telephone companies is the fact that the ruling grew out of the construction of a receiving tower near Laramie, which proposed to operate through a microwave system owned and conducted by the Mountain States Telephone & Telegraph Co. The concluding paragraph of Attorney General Black's ruling was as follows:

"It seems . . . that, since these images are carried over telephone lines and since the community corporation is a Wyoming corporation and is handling the distribution of the television images in Wyoming that, under the definition of the public utility law, the corporation comes under the jurisdiction of the public service commission and, once it is determined to be a utility, it was the intention of the legislature that the sales tax should apply."

It might be noted in passing that Attorney General Black's opinion was recently described, without further comment, in one of the bulletins which the National Association of Railroad & Utilities Commissioners sends to its state commission members. It might be presumed from this that regulatory commissions in other states, besides Wyoming, may be disposed to consider similar situations in their own states in the light of the Wyoming attorney general's ruling.

What Hath Congress Wrought?

The second, and doubtless the final, session of the 83rd Congress is history. Newspapers have been full of accounts about its accomplishments and its failures. It was remarkable in a number of ways, including the longest filibuster in history by a single senator—the indefatigable Morse (Ind.) of Oregon. But its most solid accomplishment was its record of getting something done, despite a slow start and long spells of balky progress.

Actually the 83rd Congress passed approximately 80 per cent of the so-called "must" legislation recommended by President Eisenhower. Not all of the enacted laws suited the administration in their final form. But, for the most part, they got to the President's desk and with minor exceptions he has signed them or will do so within a few days from this writing.

This is a record of legislative performance which has not been equalled since the days of Franklin Roosevelt, with his willing and overwhelming Democratic majorities in both branches. President Eisenhower, confronted with razor-thin majorities in both chambers, patiently pushed, pinched, and squeezed, and turned the other cheek when the abuse became vitriolic. The net result is a set of new laws on the statute books, which even the most hopeful administration leader in Congress did not think could be accomplished during the long, drawn-out doldrums of the spring debates and the time wasting Army-McCarthy hearings. The political opposition had counted heavily on a "do-nothing" Congress issue for the fall campaign. Whatever issues may develop this one issue has vanished.

What have been the congressional activities of the 83rd Congress (second session) of direct concern to the telephone companies? The list is modest in number, but important in effect. Of most immediate interest, of course, was the Rogers-O'Hara bill, jointly sponsored in the House by a Florida Democrat and a Minnesota Republican. This

(Please turn to page 43)

New housing developments in the rapidly expanding South mean lots of additional construction of telephone facilities. Shown here is a lineman testing new cable as construction crew passes in large telephone truck pulling new cable to be erected farther down the street.

The South Meets Great Expansion

Bell and Independent telephone companies during past several years have made undreamed-of expenditures to fill demand for service created by tremendous economic surge in nine-state southern region.

THE POST World War II South has experienced an economic resurgence never before experienced in that section — and it's still going strong. Many of the nation's largest industrial firms looked for the first time to the South for expansion sites because of the easy availability of raw materials, power, shipping ports and labor. Firms that were already there expanded their operations.

Extensive agricultural expansion occurred as new farm chemicals turned former sub-marginal land into rich, productive acreage for existing and different crops.

Evidence of industrial development as well as agricultural and business growth can be visualized by statistics covering the nine-state area of Alabama, Florida, Georgia, North Carolina, South Carolina, Tennessee, Kentucky, Mississippi and Louisiana.

Population is on the upswing. Census figures show 23,634,649 people were in this area in 1940, 26,555,536 a decade later and 27,528,000 as of July 1, 1953. Per capita income has risen from $320 in 1940 to $1,060 in 1953.

In the nine-state region, there were 18,000 manufacturing plants giving employment to 1,166,711 workers at the beginning of 1940. Now there are more than 40,000 plants employing 1,800,000 workers. In 1953, new construction of all types was 979 per cent above 1940 as compared with 615 per cent in the nation as a whole. Manufacturing output increased 422 per cent over 1940 compared with 350 per cent for the nation.

Participating in this gigantic multi-billion dollar increase in southern commerce are such plants as the 150 million dollar Kaiser aluminum reduction plant in New Orleans; an 80 million dollar Chemstrand plant in Pensacola, Fla.; International Harvester's 58 million dollar expansion program in Louisville, Ky.; American Cyanamid's 60 million dollar ammonia and nitrogen

producing plant at Avondale, La., and over 2 billion dollars for construction of atomic energy plants in Georgia, Tennessee and Kentucky. These are just a few examples.

This tremendous expansion surge had created needs for a varied number of new or additional services. To meet the demand for telephone service, both Bell and Independent telephone companies have had to make large expenditures for additional plant and facilities. Southern Bell Telephone Co. has constructed about $1,150,000,000 in new facilities in eight years in its nine-state area and it expects to spend nearly 200 million dollars for new facilities during the present year if the funds can be raised on reasonable terms.

Information on the total amount spent for new plant by Independent companies is difficult to obtain, however, they, too, have made substantial expenditures for modernization and expansion of their plants during the past several years.

Southern Bell operates 1,033 exchanges. There are 576 Independent telephone companies now operating more than a million telephones in more than 1,200 local southeastern communities.

By installing telephones at the rate of more than five per minute of every working day, the Southern Bell achieved a net gain of 266,588 telephones in 1953. More than 1½ million orders involving work on the customers' premises were handled—a record. As of May 31, the number of telephones added in 1954 reached 104,916, bringing to 4,362,449 the total number of instruments served by Southern Bell.

Applications for service continue to be heavy in 1954 although not quite as intense as during the peak 1950 period when approximately 716,000 were received. The first four months of 1954 brought 216,607 applications.

The 576 Independent companies had a 73,000 station gain in 1953. To further indicate the demand for telephone service in areas served by Independents, in the period from Jan. 1, 1946 to Jan. 1, 1954, they more than doubled the number of stations in service—from 528,000 in 1946 to 1,136,000 on Jan. 1 this year. According to estimates, the Independents, like Southern Bell, expect another big station gain in 1954.

Responding to the needs for rapid communications in the South's agricultural areas, both Southern Bell and the Independents made big expenditures for expansion of rural facilities. Southern Bell in 1953 spent 27 million dollars for new facilities, and it provided service for 80,989 new rural subscribers during the year. Continuing into 1954, an additional 29,682 rural subscribers in Bell territory now have telephones and more than $4,600,000 has been invested in facilities as of May 1.

Another familiar scene in the South nowadays is the outdoor public telephone booth located at convenient locations for those away from their homes who need the use of the telephone.

Since 1945, Southern Bell has spent more than 179 million dollars in telephone expansion work to achieve an increase of from 171,000 to over half a million telephones serving rural homes and businesses.

Additions to Southern Bell's installations in 1953 included 11 new dial units and 36 exchanges converted from manual to dial operation. The company handled some 28 million local calls per day—an average of seven calls per telephone for the highest daily "calling rate" in the nation. More than 183 million long distance calls were handled during the year. (During 1953, there were 70 million long distance calls interchanged between Independent companies in the Southeast and the Bell System.) This heavy volume of traffic was made possible by the addition, in rural areas alone, of such items as 173,000 miles of new toll circuits and 150,000 conductor miles of wire during the year. In addition, 100,000 new Southern Pine rural poles, pressure-treated with pentachlorophenol or creosote, were erected.

The Independent companies converted 90 exchanges to dial in 1953 and during the past five years they converted 302. It is estimated that conversion of exchanges to dial operation, or establishment of new dial exchanges, is definitely programmed by Independents. Most of these new dial exchanges will be placed in service during 1954 and 1955.

Television continues its phenomenal growth in the South, and Southern Bell and the Long Lines Department of the American Telephone & Telegraph Co. have expanded their facilities to meet this growing need. As of June 15, fifty-four southeastern television stations were broadcasting live network TV programs.

This expansion of network TV service required additional radio relay routes and coaxial cable as well as the necessary local facilities especially designed for television program transmission.

With the opening, on June 25, of a 404-mile microwave route between At-

(Please turn to page 39)

Significance of Storage Battery Voltage

By L. N. MARTIN

IN OUR previous two articles (TELEPHONY, Mar. 27, p. 26, and Apr. 10, p. 24) we started a discussion of the telephone power plant. We are not attempting a complete treatise on the power plant. That would be beyond the scope of these few magazine articles. Neither can we write a set of maintenance rules that would apply to all power plants. However we do have some very definite objectives:

(1) Since our general theme is "Trouble Clearing" we will point out as we go along the relation of the power plant maintenance to the trouble results of the exchange.

(2) We expect to bring out some basic facts about the power plant which will enable the practical telephone man to follow more intelligently the specific maintenance routine that applies to his particular plant.

(3) We hope to dispel some wrong ideas that are all too prevalent.

Voltage readings are important in storage battery maintenance and they are readily made with a dc voltmeter having a suitable scale and the necessary accuracy. In this case, a prevalent "wrong idea" is that high voltage means a fully charged battery in good condition and low voltage indicates that the battery is discharged or in bad condition.

We will show that this is quite wrong, although like most wrong ideas it may contain a grain of truth. Thus an abnormally low voltage would certainly indicate that something is wrong.

We will find that a battery has two voltages. Or, more strictly speaking, there are two separate and independent voltage-producing forces which combine to produce the resultant voltage which is read by the voltmeter. The first of these forces is the voltage due to the chemical action in the cell.

The amount of this voltage depends on what kinds of chemicals take part in the action. Thus the chemical combination used in the familiar dry cell produces 1.5 volts per cell.

Another type of primary battery formerly used in telephone work produced only .9 volt per cell. The type of storage battery used in the telephone office with the electrolyte at the specific gravity recommended for telephone work has a voltage of 2.15 per cell.

The voltage of the battery as a whole is 2.15 multiplied by the number of cells in series. Thus the voltage of the 11-cell battery is 23.65 and is commonly called a 24 volt battery.

This voltage depends on the *kind* of chemicals used, not on the quantity of such chemicals present. Thus a large cell with many large plates and gallons of electrolyte has exactly the same voltage as the smallest cell made.

PART 39. The preceding article in this series appeared in the April 10 issue on page 24.

This voltage does not vary with the state of charge. When a battery is one-half discharged that means that one-half of the available chemicals have been used, but the chemicals that remain are the same kind as those present when the battery was fully charged and therefore the voltage is the same.

However, we will qualify the foregoing statement.

If a battery is allowed to become completely discharged, its voltage will be zero. Hence at some point in the discharge the voltage starts to go down. However, this point should never be reached in a telephone battery.

Therefore, for practical purposes we may say that in the telephone battery there is no change in the voltage due to the state of charge and it follows that *voltage readings are of no value in determining the state of charge.*

The voltage which we are discussing is the only voltage present when the battery is on open circuit or is floating. (*Note:* A battery is on open circuit when it is not connected. It is floating when it is connected both to the load and to the generator but the output of the generator is equal to the load so that no current flows into or out of the battery.) Therefore, this voltage may be called the "open circuit voltage" or the "floating voltage."

When a battery is charging or discharging, a second voltage-producing force is present. Ohm's law states that when a current is flowing through a resistance, a voltage is produced across the resistance, and this voltage is equal to the current in amperes multiplied by the resistance in ohms. The algebraic expression for this is $IR = V$; hence this phenomenon is often called the "IR drop." "I" represents the current, "R" the resistance, and "V" the voltage.

Now a battery has resistance; hence when either a charge or a discharge current is flowing through it, a voltage is developed which is independent of the open circuit voltage.

A discharge current produces a voltage which is opposed to the open circuit voltage; hence when a battery is discharging its voltage is less than 2.15 per cell.

Notice that we did not say that a discharged battery has a lower voltage but that a battery in the act of discharging has a lower voltage than when on open circuit.

When a battery is charging the IR drop is in the same direction as the open circuit voltage hence the resultant voltage is higher than 2.15 per cell.

The IR drop is in direct ratio to the current and since on discharge it opposes the open circuit voltage, the higher the discharge rate the lower the voltage of the battery. It is also in direct proportion to the resistance of the battery. Therefore, the higher the resistance of the battery the higher the IR drop and the lower the resultant voltage. Consequently a battery with a high resistance will have a greater drop in voltage than a battery with low resistance on the same discharge rate.

The resistance of a battery is largely a matter of the total plate surface in each cell. If the cell has many plates or large plates or both, it will have less resistance than a cell with few plates or small plates or both.

In other words, the larger the cell the less its resistance. This point must be kept in mind when deciding on the capacity of a battery to be installed in the central office. For example, a small battery might possibly furnish the current during a power failure but, in doing so, its voltage would drop to a point where it would cause relay and switch trouble.

The "normal charging rate" is specified by the manufacturer for each type and size of battery that he produces. This rate should ordinarily not be exceeded. The larger the battery the higher the charging rate; hence the IR product is about the same for all batteries and, since this is added to the open circuit voltage, the voltage of a battery while being charged is about 2.35 to 2.45 per cell.

Here is a good time to say that *level voltage* is one of the chief objectives of the modern power plant. It is very difficult or impossible to obtain satisfactory relay and switch operation if the battery has a wide variation in voltage.

The ideal plant maintains a constant voltage even during a power failure or when charging the battery. If the power plant is designed and maintained so that it furnishes constant voltage at all times, the number of trouble reports and subscriber complaints will be greatly reduced.

The power board is ordinarily equipped with a voltmeter for reading the total voltage of the battery. (In a very small plant this voltmeter may be part of the rectifier.) However, this meter may not show the exact battery voltage.

If the power board is at some distance from the battery, there will be a variable IR drop between the battery and the power board. This may be prevented by having a special meter on the power board for measuring the battery voltage. This meter is connected directly to the battery by its own leads and the meter is calibrated to read correctly through these leads.

Also, the meter should have the proper scale and should read correctly to .1 volt. "A suppressed zero" scale is often used. Thus for the 11-cell battery, a 15-30 scale may be used in place of the usual 0-30 scale. The 15-30 scale is twice as large as the 0-30 scale and hence is easier to read accurately. The meter may be mounted on a hinged bracket so that it may be faced in any direction and it should be turned towards a position where some employe, such as the test man, is usually stationed. A separate meter may be provided for measuring the voltage at the power board or at the bus bars.

The principal use of this meter is to assure that the battery is at all times maintained at the desired floating voltage which is usually somewhat higher than 2.15 per cell. This point should be marked on the scale of the meter.

Voltage readings of the individual cells are an important part of the battery routine and, if correctly made and interpreted, will give timely warning of individual cell trouble. A portable voltmeter having a 0-3 scale and accurate to .01 volt is used for this purpose.

As previously stated, the open circuit or floating voltage is very constant under all states of charge. It may also be normal under many serious trouble conditions. Therefore, *individual cell voltage readings made when the battery is floating are of little or no value.*

If a battery were not in use, this test could be made by connecting the battery to a fixed load while making the individual cell readings. This cannot be done in the case of a working battery as the load is always variable and cannot be disconnected.

The test is therefore made with the charging current flowing. If the plant is arranged for automatic charging, the switch is thrown to the charging position which holds the battery at a constant charging voltage (about 2.40 per cell) and hence at a constant current.

If the power plant is not arranged for automatic charging, it may be necessary to station one man at the rheostat to hold the charging current at a constant value while another man makes the voltage readings.

The individual cell voltage readings are made in three steps as follows:

(1) While the charging current is constant, read each cell to the nearest .01 volt and record these readings.

(2) Add all of the readings and divide the sum by the number of cells in series to obtain an *average cell voltage.*

(3) Compare the voltage of each cell with the average voltage, noting those cells which are above or below the average and the amount of such variation.

If a cell has a voltage too much below or above the average, it is an indication of trouble in that cell. The amount of voltage variation that is permissible differs with the type of battery and *is specified by the manufacturer.* It is usually less than .05

The individual cell voltage test is really a test of the resistance of the cell. A voltage below the average indicates a low resistance such as that caused by a partial short.

A voltage higher than the average indicates a high resistance and usually indicates a lack of activity in either the positive or negative plates. Extreme cases of high voltage may be caused by broken plates.

The record of specific gravity readings also should be compared to the voltage readings as most cases of trouble will cause irregularities in both the voltage and the specific gravity. (The specific gravity readings unlike the voltage readings are made when the battery is floating.)

A small telephone company will not be equipped to do battery repair work. Unless their closed and sealed cells have glass jars (somewhat out of style now) they will not even be able to see the plates of their battery. However, these tests should be made at regular intervals—at least once a month.

If irregularities are encountered, the test should be repeated several times at intervals of a few days. Also specific gravity readings should be made.

If the irregularities still persist in the same cells and a prolonged charge does not clear the trouble, the next step is to write or call the manufacturer giving him full information about the readings.

If his guarantee has not expired, he should take part of the case; but even if there is no guarantee, he should give you expert advice and help at a reasonable cost. He is interested in having your battery give you good service and a long life. Some types of trouble can be diagnosed and treated without even disassembling the cell.

If the battery is a very small one, such as a PBX battery, the cost of repairs should be compared to the cost of a new cell. In the case of a very small battery, the best solution may be to replace the cell. However, most central office batteries are expensive enough to justify considerable repair work.

Local battery shops are usually not qualified to work on a telephone battery. Do not employ such people unless they have been recommended specifically by the manufacturer of your battery. If you are located near one of the very large telephone companies you may be able to obtain advice and assistance from one of their battery specialists.

We will have much more to say about batteries and power plants in coming articles.

V V

"Evils in the journey of life are like the hills which alarm travelers upon their road; they both appear great at a distance, but when we approach them we find that they are far less insurmountable than we had conceived."—COLTON.

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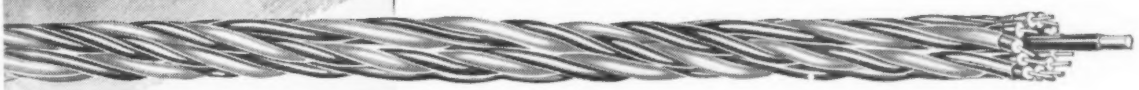

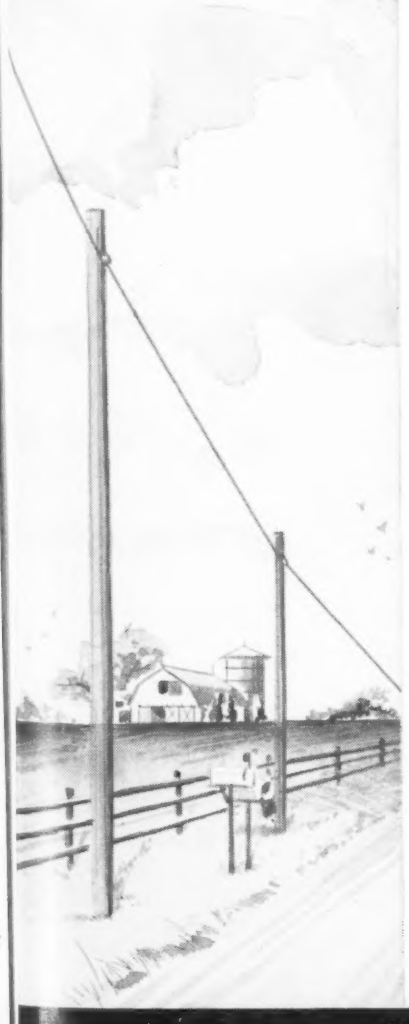

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CARRIER SYSTEMS

By HAROLD B. McKAY

Part 6—Crystal Diodes

A CRYSTAL diode is made of a piece of silicon, germanium or other material, on which contact is made by a small pointed piece of wire. It is a refinement of the old "cat-whisker" detector which was used in the early days of radio.

The diode has the property of acting as a rectifier; that is, current will pass freely in one direction, but encounters higher resistance when the polarity is reversed. Actually, the crystal diode is not a perfect device, and some reverse current may pass through the crystal. Accordingly, ratings for these crystals frequently specify the resistance in each direction.

Though the diode basically does nothing but rectify a current which is passed through it, this property can be applied to a greater number of useful electrical circuits. In our description of modulators, it was shown that a crystal diode arrangement could be used to modulate or mix frequencies. A crystal can also be used in a circuit where it acts as a relay. Some carrier systems use a number of crystals in various applications and a further description of these uses is in order here.

Relay Function

It has been mentioned that some systems use a 3700-cycle alternation current for signalling; that is, a 3,700-cycle signal is turned on or off in the carrier to indicate if a trunk is seized, to indicate if the receiver is off or on the hook, to relay dial pulses, etc. Normally this function originates with a relay or a moving contact in some circuit which is not a part of the carrier, and is usually a dc current which is turned off or on. In order to make this dc turn the 3,700-cycle current off and on in the carrier, some type of additional relay is needed. Two crystal diodes can do this, and have the advantage of no moving parts and no dirty contacts.

In *Fig. 17* is shown a source of 3,700 cycles, or any other frequency for that matter. It usually is supplied by a vacuum tube oscillator. It is served to the carrier channels through the transformer on the left, and may be common to all channels in a system. The transformer on the right is individual to the carrier channel equipment.

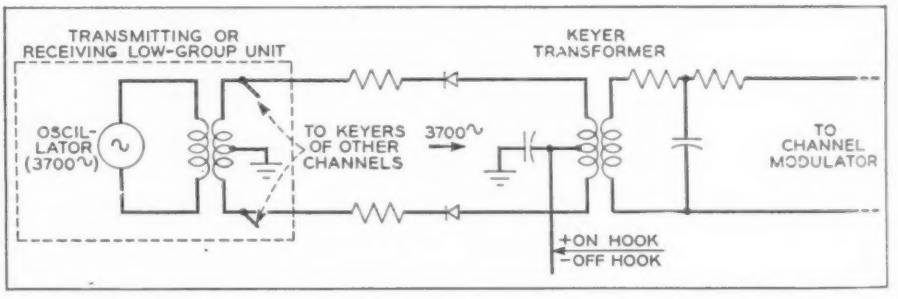

Fig. 17. In this circuit two crystal diodes perform like a relay. With "off hook" conditions, the crystals block the 3,700-cycle ac signal current. When "on hook," positive dc goes through the crystals to transformer center-tap ground. The 3,700-cycle ac "rides through" the crystals on the dc and ultimately reaches modulator and line. (Drawing courtesy of *Bell System Technical Journal.*)

As the equipment stands, the 3,700-cycle ac does not get through to the left transformer. This is because both crystals point the same way. Normally, the crystal conducts when the arrow is supplied with positive potential, the flat line with negative. When the ac is positive on the top line, it can go through the top crystal, but cannot complete a circuit through the bottom one, so no current flows. When the ac reverses, it gets through the bottom one but not the top, so no current ever flows.

However if negative battery is placed on the M lead by the other circuit equipment, a direct current flow will be established from the positive central office ground, out both sides of the transformer, through both crystals, to the left transformer center tap and to battery on the M lead.

Simply stated the presence of the dc permits the ac to flow also through the crystals. Thus the crystals act like a relay, turning the ac on and off as the dc is turned on and off. However, though simply stated, the actual behavior of the electricity in the circuit is not always easily understood. Yet, because this same action of crystals is used elsewhere in carriers, it is well to have a good concept in mind of the actual action.

Paradoxical as it may sound, the ac gets through the crystal, even though the crystal will not pass current in the reverse direction. Some find it convenient to assume that the ac "rides through" on the dc; that a crystal is like a gate, which when opened by dc, permits ac to pass. (Something like opening the door to put the cat out and having the dog sneak in.)

This concept is adequate enough to understand circuit operation, and is a great help in figuring out compressors and expandors, even though technically inaccurate.

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A more accurate description of the crystal action must include mention of the fact that when ac and dc are combined on one circuit as it is here, the dc adds to the ac voltage when the polarity is in series aiding, and subtracts when the ac reverses to series opposing. Interesting things happen when the ac and dc voltages are different.

Suppose a 6-volt transformer is connected in series with a 2-volt battery. When the side of the transformer connected to the negative side of the battery goes positive, the two add, and an 8-volt potential is developed with positive polarity. When the ac reverses, it subtracts from the battery, and a 4-volt negative polarity results. (See *Fig. 18.*)

Suppose, now, that the battery is also raised to 6 volts; the positive ac voltage

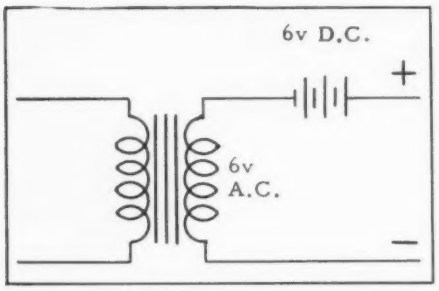

Fig. 18. In this circuit, at the plus and minus terminals, the voltage will fluctuate from zero to 12 volts as the ac changes polarity. The output, however, will not change polarity but will remain as shown. It is by this principle that ac can apparently "ride through" a rectifier crystal that is carrying dc.

will drop to zero. The output of this circuit then would be a voltage fluctuating from zero to 12 volts, which would act as ac in coils and condensers, but which actually always presented the same polarity.

This is the situation when a crystal functions as a relay. When ac alone is presented to the crystals, with the reversing polarity, one or the other crystal blocks. When dc of sufficiently high voltage is added to the circuit, the ac acts like fluctuating dc and passes through the crystal.

However, when this fluctuating dc passes through a transformer, only the ac gets through and the dc is left behind. Basically this is the same principle as the telephone transmitter, which converts the battery voltage to "undulating dc" which becomes ac when it goes through the first repeat coil on the circuit.

In passing, it should be mentioned that the foregoing example is a straight on and off proposition. That is, it was shown that the ac would definitely pass if dc was present, and would not pass if dc were not present.

Actually, intermediate results can also be achieved. If the dc voltage is lowered to a point below which all of the ac will pass, it is possible to have some ac pass. In the example with a 2-volt battery, it should be noted that some ac will pass in the form of fluctuating dc, but that which is passed has a voltage which is lower than the full ac voltage which is passed at 6 volts dc.

Thus, in addition to working on or off like a relay, the crystal can be made to control or regulate the voltage or volume of an ac signal. This important function is the basis of modern compressor and expandor action.

Compandors

The name "compandor" is derived from a combination of the words "compressor" and "expandor." Although they are two separate devices, working respectively on the transmitter and receiver portions of a carrier channel, they are frequently supplied mounted on one chassis unit, and are hence called by the combined name.

All carrier systems do not have these devices as built in components, but they may be added to some non-equipped units as accessories when the occasion requires.

The need for this device arises from the fact that the wire line on a carrier system is a source of noise. How clear a person's voice may sound is dependent largely upon how much background noise there is. If the noise level is high, speech can be improved if the voice is made louder.

For example, if two people are conversing in a noisy factory, they can make themselves understood if they talk louder. That is, they raise their voice without increasing the loudness of the factory noise. However, in a carrier, if the receiving amplifier were boosted in power, it would not only raise the voice loudness, but would also increase the noise and the circuit would be as bad off as it ever was. If the transmitted power is increased, cross-talk to adjacent circuits can result.

The quality of transmission on a circuit is judged by the so-called signal to noise ratio. This is usually expressed in decibels, but it can be remembered that the quality of transmission depends upon the number of times louder the voice is when compared to the noise. Because the principal noise occurs on the line, a method which will boost or amplify the voice when it is not on the line, will produce the results required without magnifying the noise.

A compressor circuit will do this. A compressor circuit is one which reduces the volume of loud sounds, and increases the volume of soft sounds. Medium sounds pass through the circuit unaffected.

By cutting down the loud sounds and boosting the soft ones, the circuit compresses the *range* of the volume, hence the name. By cutting down the loud sounds, it reduces the possibility of cross-talk. It also permits amplification of the soft sounds without raising the level of loud sounds to the blasting point. A simple amplifier would do this, because all sounds, weak and strong would be boosted equally. While this might be desirable in a public address system, it is not wanted in a carrier.

Note that this circuit does not make all volumes of sound come out at an equal loudness. If one could listen in at the output of the compressor, a great deal of the expression of the voice would be gone, but it *would not* be a monotone. The sounds which were originally very loud would still be louder than the soft sounds, but there would not be as much difference between them as in the original speech.

The advantage of boosting the low sounds up is that this is done before the voice goes out on the line. Therefore, the amplified soft voice sounds go out with considerably more volume than the noise which will be on the line. Because the voice is amplified before it went on the line, the noise is not amplified.

At the receiving end it is necessary to undo the effects of the compressor and restore the voice to its normal range. That is, the soft sounds (which were amplified) must be made softer, and the loud sounds (which were cut down) must be made louder, thus giving the received voice the same excursion of volume that the speaker put into the other end. The expandor does this.

Expandor

Electrically, the circuit used for the expandor operates on a similar principle to the compressor but is connected for a reversed effect. In passing, it is of interest to note that compressors are used in the manufacture of phonograph records and expandors used in high quality phonograph reproducers. This is done to overcome the effect of record noise, just as the carrier uses it to overcome the effects of line noise.

It might be well at this point to demonstrate the distinction between compandor action and other regulators. The regulators previously mentioned are in the nature of automatic volume controls. Like the automatic volume controls on a radio set, they may approach the problem from one direction only—that of raising the volume of weak

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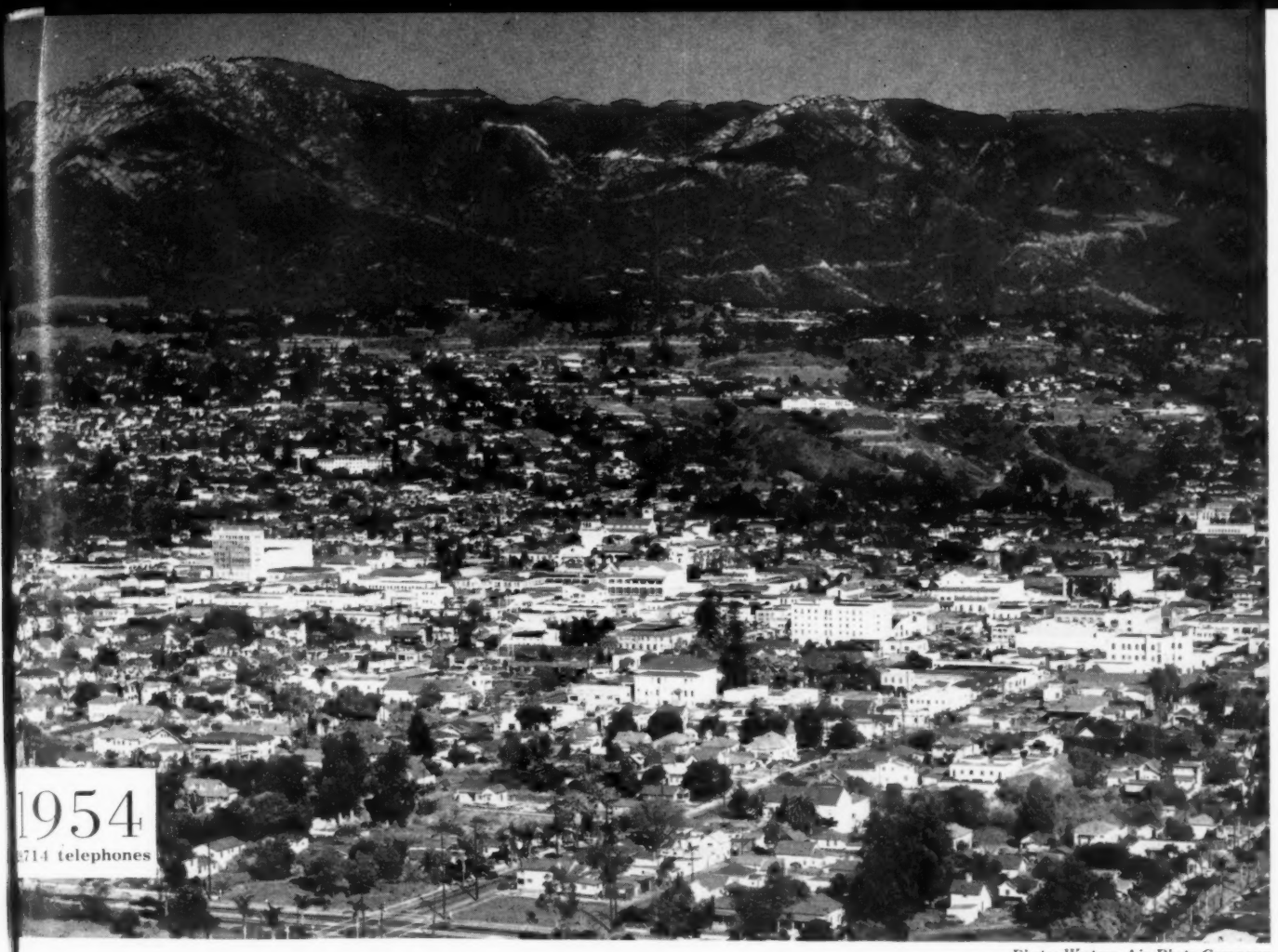

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sounds, hence, they may also raise the noise level.

In one type of carrier system using thermistors, if the carrier circuit goes open and completely fails, the regulator at the receiver will interpret the noise on the line to be a weak carrier, and amplify this noise to an extreme volume level.

Further, carrier regulators are essentially slow-acting devices. Special features built into this equipment prevent it from responding to transient changes in pilot or carrier strength. In fact such regulators may take several minutes to readjust to changing line conditions, which is satisfactory because line conditions usually change gradually.

The compandor on the other hand responds almost instantly. In fact, it has a timing feature consisting of a resistor and condenser which delays its action only for the length of time for a syllable of speech. Without this timing feature, the compressor action would be so fast that it would practically erase the speech by cancelling each sound as it was uttered.

There are a number of ways in which compressors and expandors can be built. Essentially, they both consist of devices which continually sample or measure the speech being sent, and readjust the gain or loss of a connecting circuit to achieve the effect desired. This is usually done by rectifying or changing into dc a portion of the fluctuating speech voltage. This dc will fluctuate also as the volume of the voice changes.

This resulting dc is placed across a condenser, which as explained under condenser action, prevents current from passing beyond until the condenser is charged. This provides the delay for syllables as mentioned above. The dc when it finally gets past the condenser is then fed into a device which will regulate the output of the amplifier.

In the case of the compressor, the stronger this dc voltage from the voice, the more loss will be placed in the circuit (or the amplification reduced) in order to make the loud sound weaker. If the sound is weak to start with, practically no dc will be developed, and no loss will be put in the circuit (or maximum amplification will be given). In the expandor, a dc voltage is obtained from the voice in a similar manner but it is hooked up to give an opposite effect.

In circuits using vacuum tubes, this dc is merely connected to a grid of a vacuum tube, where it varies the degree of amplification just as a volume control would. The effect of compression or expansion is achieved by merely reversing the polarity of the dc voltage.

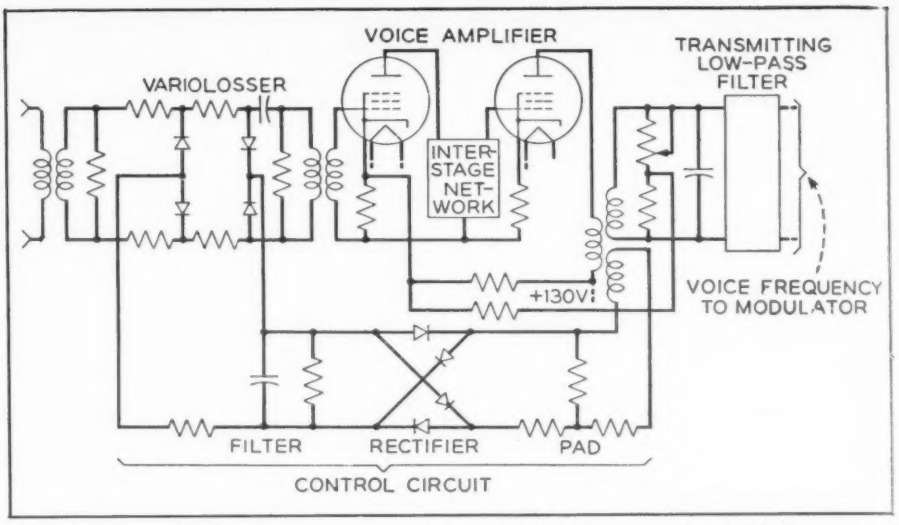

Fig. 19. The heart of this compressor circuit is a "variolosser," a device which by means of crystal diodes shunts down the voice to a varying degree and thus regulates its volume. (Drawing courtesy of *Bell System Technical Journal*.

However, the use of the crystal diode has found a wide application in carrier systems, particularly in compandors. Because a number of crystals are used, the method of operation is not always apparent by a casual glance at the print. Because of this, and because of the fact that this method is now being used by different manufacturers, a detailed explanation on operation will be given here.

It should be remembered from the first part of this article that the crystal diode will, *in effect*, pass alternating current, if a dc voltage is also supplied to it in the right direction. Furthermore, this action is variable; that is, the more dc applied, the more ac will seem to "ride through." In other words, the dc can make the crystal act as a variable resistance or rheostat as far as the ac is concerned.

Circuit Action

Fig. 19 is the first part of the transmitting portion of a carrier channel. The voice comes in from the switchboard to the transformer at the upper left. Disregarding the action of the variolosser for the moment, note that the voice will move to the right, through the second transformer into the grid of the first amplifier tube. There it is amplified and comes out at the plate, through the interstage network, into the second tube, where it is further amplified.

At this point it enters the three-winding transformer at the right. From the top right hand winding it goes on to a filter, then out to the modulator and line.

If the control circuit shown in the lower part of the drawing were not present, the voice would be greatly amplified at all times, for the vacuum tube circuit is a simple audio frequency amplifier such as was discussed earlier in these articles. Trace this circuit from the input on the left to the output on the right and make sure its action is thoroughly understood.

Now for the compressor action. In the three-winding transformer in the plate circuit of the right hand tube, note that the lower right hand winding connects to a pad (made of resistors) and a rectifier. A portion of the amplified voice current is taken by the winding of the transformer and rectified, then impressed upon a filter which is composed of a condenser and resistor. The rectifier is of the lattice type and is made up of four crystals, represented in the drawing by the four little triangular arrows. The condenser in the filter is the one previously mentioned which is used for timing. It prevents the dc from entering the variolosser until it is charged, thus preventing the compressor from acting too fast.

Variolosser

The four crystals between the two transformers in the input circuit are the heart of the variolosser. To understand the operation, assume that cu-

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rent will flow through them when the triangular arrow is positive, and the plate or cross-line touching it is negative.

Note that up until now, these crystals have no effect upon the voice which is passing above and below them. The voice is alternating current, hence when it is negative on the upper wire (under the word "variolosser") it will get through the upper left hand crystal, but not through the lower left hand crystal. It will also be blocked at the upper right hand crystal. When the current reverses, the opposite crystals will block it. In other words, one of the crystals in each pair will always block the ac voice current no matter what the polarity. Therefore, all of the voice will get through to the amplifier and none will get lost in the crystals.

Note, however, that when dc comes up from the filter in the control circuit with the positive polarity on the left hand wire, this dc will travel through both of the left hand crystals in the variolosser, through the upper and lower resistors, through the right hand pair of crystals and back to the filter. Trace this path.

Remember that this dc will have the effect of permitting the ac voice currents to "ride through" the crystals. This will have the effect of shorting out some of the voice. The more dc which flows in this circuit, the more the voice will be shunted down, and the amount of voice left to reach the amplifier will also be reduced. This in effect controls the volume of the voice.

Remember that the dc current for the variolosser is rectified voice current which has been amplified. Therefore, the strength of this dc will vary with the strength of the voice. The louder the voice, the more dc will be produced in the control circuit, and the more the voice will be shunted down by the variolosser crystals to reduce its volume. Thus, the loud sounds which come through are automatically made softer.

If a sound of low level comes through, very little, if any, dc will be developed by the control circuit. Therefore, the variolosser crystals will have little, if any, shunting down effect. Accordingly, the soft sounds will get the full benefit of the gain provided by the amplifier and will be made louder before they go out on the line. Thus, the louder sounds are made softer and the soft sounds made louder, which is compressor action.

Note that this is done before the voice is converted to carrier and before it is sent on the line where noise will be encountered. Hence, the voice is

(Please turn to page 40)

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THE PLANT MAN'S Notebook

by Ray Blain, Technical Editor

WE VISITED a dial telephone exchange the other day where everything was spotless, and we inquired as to what cleaning method was used to remove dust from the equipment. The man in charge proudly showed us a power-driven air compressor with a hose and nozzle which he used at regular intervals to blow dust out of the equipment.

This compressor was not equipped with an air dryer of any type and it was claimed that no trouble had ever been caused due to moisture. Personally, we believe that they are taking a considerable chance. Also, there are certain maintenance engineers who claim that to blow dust out of equipment is asking for trouble since the air pressure often drives dust particles into places where it is certain to cause trouble later. They prefer to pull dust out of the equipment with a powerful vacuum cleaner.

Undoubtedly, the best method is to keep dust out of equipment in the first place by the use of air-conditioning, or by maintaining an air pressure in the equipment room so that dust cannot enter.

If equipment must be cleaned at certain intervals in order to remove an accumulation of dust, we prefer the large type vacuum cleaner designed specially for this type of cleaning. One such device requires that a canvas cover be placed over an equipment bay before the vacuum cleaners are placed in operation. This machine proves most effective in the removal of dust from the equipment and causes a minimum amount of trouble.

• • •

It has been said that you've reached middle age when you know how to take care of yourself—and intend to, one of these days.

• • •

We have received a letter from W. E. Black Jr. of the Southern Bell Telephone & Telegraph Co., Charlotte, N. C., concerning an item which appeared on this page in the June 12 issue in which we discussed intelligible and unintelligible cross-talk and noise. We mentioned that if cross-talk is unintelligible, it is not cross-talk at all, but only noise.

Mr. Black voices his dissenting opinion with the statement: "How about a case where two Chinamen are discussing the weather in their native tongue over the telephone, and you hear them loud and clear on the disturbed circuit? Is what you hear cross-talk, unintelligible cross-talk, or noise?"

In our opinion, anyone who ever heard two Chinamen discuss anything would readily agree that it is certainly always a lot of noise. At any rate, since the writer does not understand the Chinese language, even though it might be heard clearly and loudly on the disturbed circuit, it would certainly be unintelligible cross-talk to him.

• • •

In a letter recently received from D. Reginald Tibbetts, manager for the Moraga (Cal.) Community Telephone Co., he states in part as follows:

"I note with interest your comments on the operation of private radio systems by the operating telephone companies. There are quite a few of these so operated, including the entire state police system in New York state by the Bell System.

"In this area, the VHF System for the San Francisco Terminal Yards of the Southern Pacific Railroad is operated by the Pacific Telephone & Telegraph Co. This system is identical with their local public VHF using similar transmitters and receivers except that it is terminated on the Southern Pacific switchboard instead of on the Bell mobile service toll positions."

• • •

The Southwestern Bell Telephone Co. is using "air-conditioning" of their exchange cables in one location as an effective means in defeating the ravages of small insects. This air-conditioning consists of circulating dry air through exchange cables. The air, seeping through the bug-punctured cable sheath, keeps out moisture.

At Brownsville, Tex., this bug with the cable-boring inclinations has long been a source of headaches to the plant people. Named *Scobicia Declivis* by scientists, and the "short-circuit" bug by plant men, this insect confuses lead with hard woods, finds a cable and bores away.

Of course, this means trouble with the first damp spell, or did—before the days of the dry-air or compressor-dehydrator machine. This machine is fully automatic, regulated to maintain a steady flow of air and hold the moisture out of 125 sheath miles of Brownsville exchange cable.

• • •

In New Jersey and other coastal regions, certain birds cause trouble for the utility companies by building nests on the cross-arms of open wire lines. The osprey, commonly known as the sea hawk or fish hawk, is the principal offender. The osprey is an eagle-sized bird that lives on fish. He loves to build his nest, made of barbed wire, cornstalks, sticks and other rubble, on the utility cross-arms, resulting in a mass that sometimes weighs 100 pounds.

The theory is advanced that poles are handier because the osprey, returning to a nest in an ordinary tree, has to dodge around heavy foliage. The cross-arms and wires are easier to reach and consequently are selected as an ideal location for nest building.

In some of the more heavily osprey-populated sections along the East Coast, dummy poles have been erected by utility companies for nesting purposes. When these poles are baited with a few pieces of building material, a nest-building osprey can usually be attracted away from the nearby working open wire lines.

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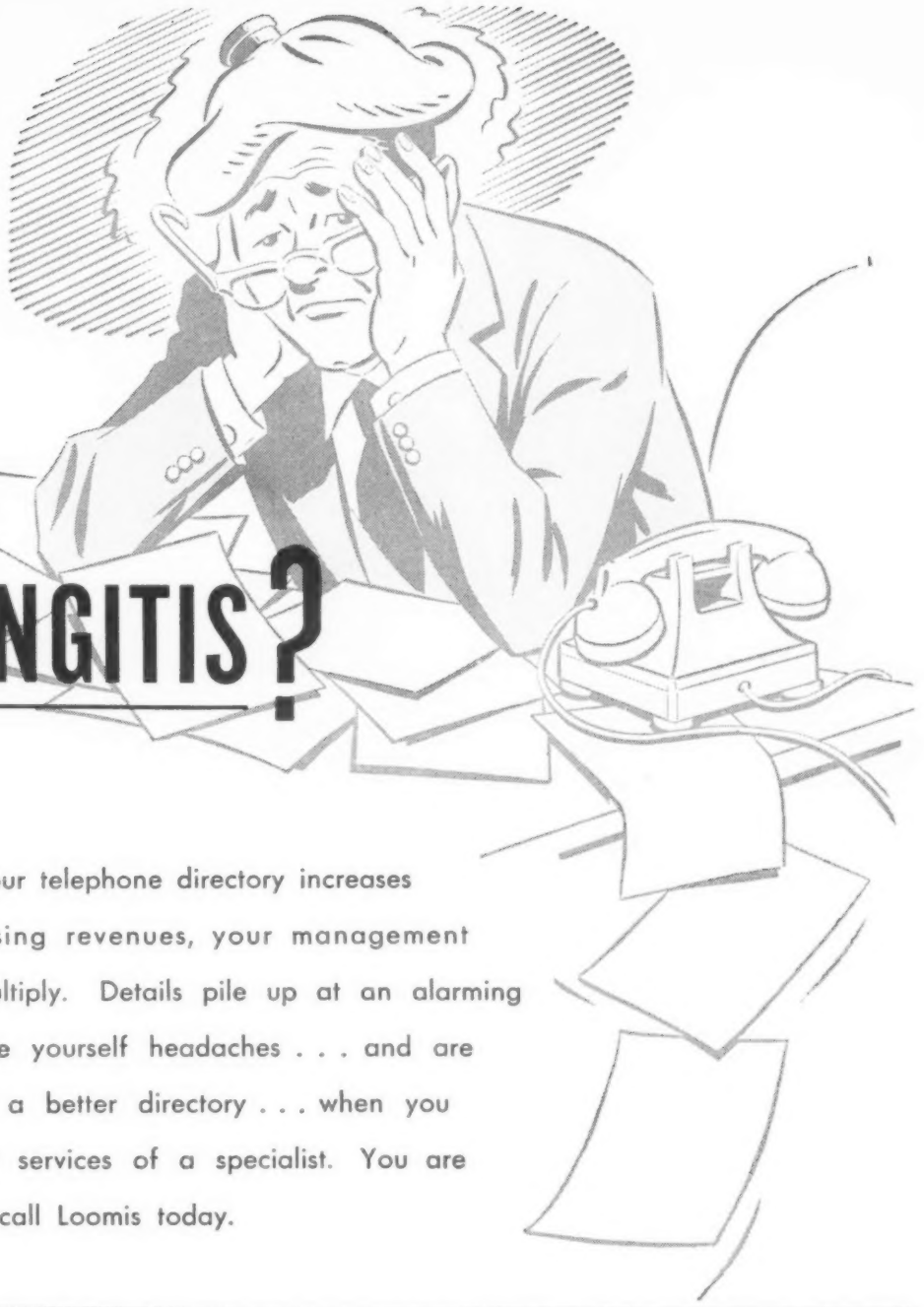

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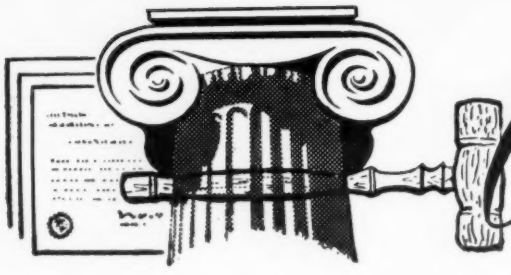


Courts and Commissions

Kan. Co-op Buys Two Companies; Seeks to Buy a Third

The Craw-Kan Telephone Cooperative, Girard, recently secured Kansas Corporation Commission approval of its purchase of the Hiattville Telephone Co. from George Brock, and the Hepler Telephone Co. from D. D. Ensley (TELEPHONY, Mar. 27, p. 30).

The Craw-Kan co-op is seeking commission approval of its purchase of the Crawford Telephone & Telegraph Co., Girard, and its three exchanges.

V V

Utah Independent Granted Rate Raise Authority

Elbert Beal, manager of the Fountain Green Telephone Co., recently stated that permission has been granted by the Utah Public Service Commission for a rate increase.

The new rates will be: two-party business, $4.00; multi-party business, $3.00; two-party residence, $2.75; multi-party residence $2.00.

It was reported that previously all rates in Fountain Green have been $1.00 per month.

V V

Missouri Commission Considers Two Sale Applications

The Missouri Public Service Commission on Aug. 17 received the joint application of Sherman Crass to sell and Alphus E. Shaffer to purchase the Myrtle Telephone Co. Also, the commission set for hearing on Sept. 22 the application of F. E. and Lillian Boone, doing business as The Camden Point Telephone Co., to sell and the United Telephone Co. of Missouri, Kansas City, to purchase the exchange and system at Camden Point.

V V

Florida Commission Hears Proposed Rate Increase

A rate increase proposed by Winter Park Telephone Co. recently was heard by Florida Railroad & Public Utilities Commission.

Evidence presented by company officials showed little additional revenue would be realized by the increase because of a proportionate rate decrease for an "intercity" hookup with Orlando telephones (served by Southern Bell Telephone & Telegraph Co.).

V V

Approve $13,244 Rate Raise For Ohio Independent

The Bluffton Telephone Co. recently was permitted an additional $13,244 in annual revenues by the Ohio Public Utilities Commission.

For one-party residence service, charges will advance from $3.50 to $4.75; five-party, from $2.50 to $3.75, and 10-party rural, from $2.50 to $3.00.

One-party business service will advance from $6.00 per month to $7.50; two-party, from $5.50 to $6.50, and 10-party rural from $4.50 to $6.75.

At the time application for increased rates was filed with the commission about a year ago, company officials said that the valuation of the Bluffton system was $248,574, and that it required a working capital of $7,300. The approved increase will result in a 5.64 per cent rate of return, according to the company's figures.

The rate boost will affect approximately 1,146 subscribers served by the Bluffton exchange.

V V

N. C. Attorney General's Office Testifies in Stock Price Case

Backing its contention that stock of the Carolina Telephone & Telegraph Co., Tarboro, can be marketed for more than its $100 per share par value, the North Carolina attorney general's office presented testimony to the state utilities commission on Aug. 16 by an investment broker who said his firm would be willing to underwrite the stock at $130 per share (TELEPHONY, July 24, p. 36).

The testimony was by Walter G. Mason, vice president of Scott, Horner and Mason, Inc., of Lynchburg, Va., but attorneys for the telephone company contended that the offer to underwrite the stock was little more than a "gesture" and that Mason's firm could not undertake to underwrite the entire issue and could not guarantee that other underwriters would join it in selling the stock at $130.

The hearing was in connection with a case in which the commission approved a proposal of the company to issue new stock but stipulated that it should be sold for not less than $115 per share instead of the $100 par value proposed by the company. The company sought to issue 33,320 shares but held out for the right to sell at par value and took the matter all the way to the North Carolina Supreme Court, which remanded the case to the commission with instructions that it show why it fixed the price of the stock at not less than $115 a share and why the sale at that price is "compatible with the public interest."

Since the case was considered by the court, the company doubled the amount of stock it is seeking to issue and now wants to issue 66,640 shares at $100 per share.

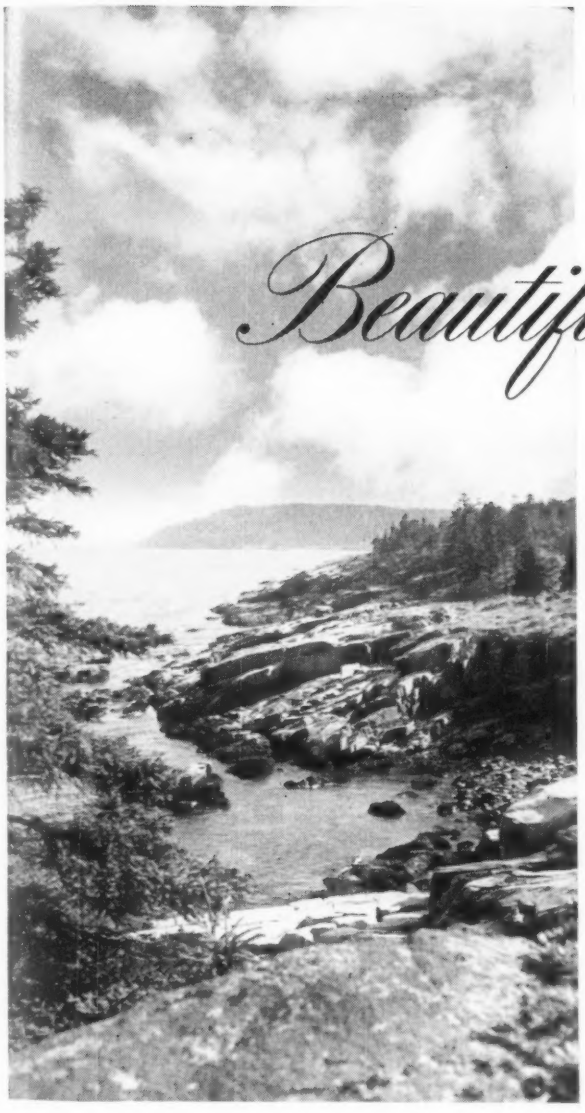
At an earlier hearing Carolina T&T officials and attorneys contended that the market for its stock might be weakened if they are required to sell it for more than par, and that the commission's attempt to fix the stock price amounts to an invasion of the rights of corporate management.

L. W. Hill, president of the company, pointed out that the company plans to issue the stock to present stockholders at the rate of two shares for each five shares now held, and protested that a price of more than par would cripple the company's ability to raise equity capital.

"We know," he testified, "that a departure from our proven successful policy may well entail additional heavy expenses to the corporation, and there is every reason to apprehend that such a departure will at some time in the foreseeable future endanger the success of a common stock issue."

At the hearings just held, Mr. Hill said a price of $130 per share would result in many stockholders not exercising their rights to buy the new stock; but in answer to a question from Commission Chairman Stanley Winborne, Mr. Hill also said that the stock now is selling on the open market for between $144 and $147 per share.

Assistant Attorney General I. Beverly Lake, whose office is appearing in the case in the interest of the public, contended that the company would gain



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The 45BX can be interconnected—on an *intermediate frequency* basis — to other 45-class carrier systems, requiring only inexpensive converters. And the miniaturized plug-in components and channel units of all these 45-class systems are interchangeable —for additional economy, convenience, and flexibility.

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HELPFUL FACTS ON THE TYPE 45BX FOR THE TECHNICALLY MINDED:

- The number of channels that can be utilized depends on the modulation bandwidth of the radio system. A 48-channel system requires a spectrum of 40 to 264 kc, while a 24-channel system requires only 40 to 140 kc.

- An automatic channel regulator controls circuit net losses within less than 1 db.

- Adaptable to various signaling and dialing needs.

- Compandors are available with Type 45BX equipment for those situations where additional fade margin is indicated or other characteristics of the radio path and equipment make their use desirable.

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rather than lose by getting a price nearer market value, declaring that a price of $130 per share would bring the company about 8½ million dollars, rather than the $6,664,000 it would get if the stock goes for par.

Mason and a member of his firm, James L. Morris, said that $130 per share would be a reasonable price in view of the present market conditions. They said they based their estimate on past experience in handling telephone and utility stock issues and on the investors' general regard for Carolina T&T stock. They said the company's stock has a good reputation and that the company is considered sound and well-managed.

V V

New York Independent Company Reported Bankrupt

The Delaware & Sullivan Telephone & Telegraph Co., Long Eddy, N. Y., has reportedly filed a petition in bankruptcy. All telephone service was to cease on July 17, the office to remain closed until the appointment of a receiver who will decide whether or not to operate the system. In the meantime, the New York Telephone Co. has installed four public telephones in Hankins and Long Eddy as an emergency measure, it was reported.

The Delaware & Sullivan company was chartered in 1907.

* * *

Jack W. Haverly, manager of the Delaware Telephone Co., Walton, N. Y., was appointed receiver for Delaware & Sullivan T&T by Federal Judge Alexander Bicks, following a petition from the New York Public Service Commission which advised that resumption of service was necessary.

V V

Indiana Commission Approves Sale to Bell-Owned Company

Sale of Charlottesville Switchboard Co. to Union Telephone Co. was approved on Aug. 18 by the Indiana Public Service Commission.

The Charlottesville company serves about 130 telephones in the Hancock County community.

The Union company is owned by Indiana Bell Telephone Co.

V V

Ore. Company Seeks Rate Raise

A hearing on a proposed new rate schedule filed by the Glendale Telephone Co. recently was to have been heard by Charles H. Heltzel, Oregon Public Utilities Commissioner.

FCC Approves Sale of Wisconsin Independent

Sale of the Van Dyne (Wis.) Telephone Co. to the Wisconsin Telephone Co. was approved on Aug. 19 by the Federal Communications Commission (TELEPHONY, Jan. 23, p. 34).

Van Dyne, which presently has magneto telephones, will be converted to dial by the end of 1954, a spokesman for the Wisconsin Telephone Co. said.

When the cut-over is completed, Van Dyne subscribers also will be able to call Fond du Lac or Oshkosh directly without extra toll charges.

V V

Indiana Company Requests Fair Return on Property

In a petition to the Indiana Public Service Commission the Citizens Independent Telephone Co., Terre Haute, requested an increase in rates, it was reported on Aug. 3. The company said its present rates and charges are "unjustly and unreasonably low, and insufficient."

Citizens company has made but one rate increase in the past 24 years, according to Clifton E. McCormick, the company's vice president and general manager. The boost came in April, 1952, when the company petitioned the commission for an increase. Mr. McCormick compared local rates with rates charged in numerous other cities the size of Terre Haute in attempting to show that rates here are low.

In the petition the company asked for an increase that would produce a "fair return on the fair value of its property."

Operating costs, including employe wage rates and cost of adding and replacing equipment needs for its service, also figure in the need for increasing rates, Mr. McCormick said.

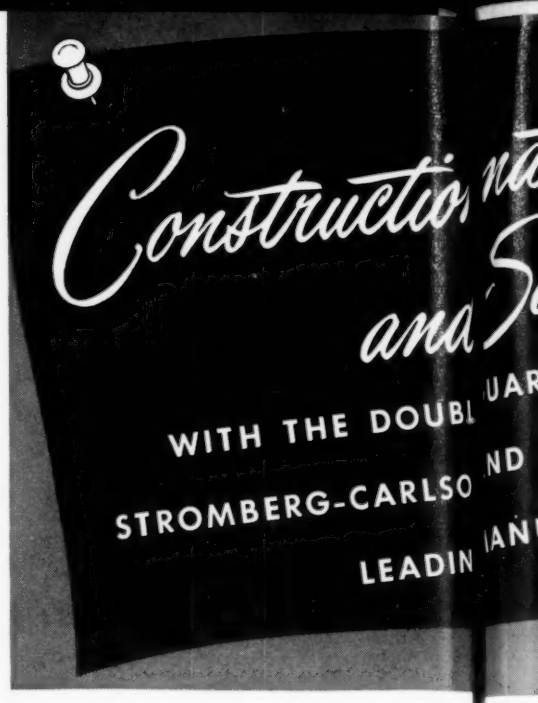
V V

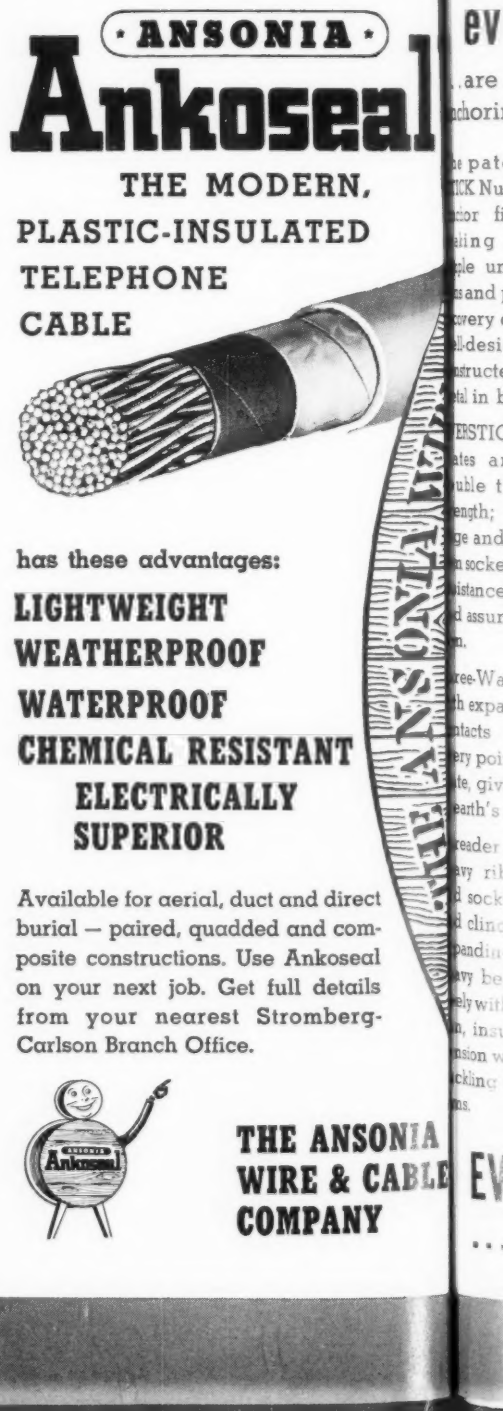
West Coast Telephone Co. Seeks Washington Rate Increase

A petition for increased rates has been filed with the Washington Public Service Commission by the West Coast Telephone Co., Everett, according to announcement on Aug. 11 by Ray Dalton, vice president, who said the boost would cover increased costs of providing "extended service" and other operating expenses.

The proposed West Coast company rates would apply for Kirkland, Redmond and Bothell exchanges when "extended service" is put into effect in early October, and for Halls Lake and Richmond Beach exchanges when "extended service" begins in November.

West Coast's new rates for four-





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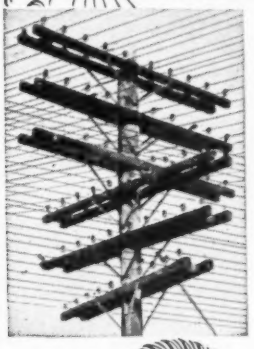

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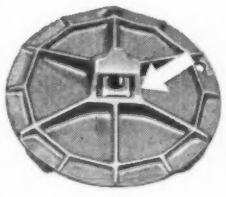

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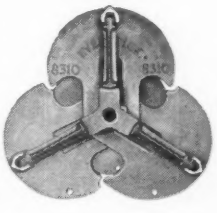

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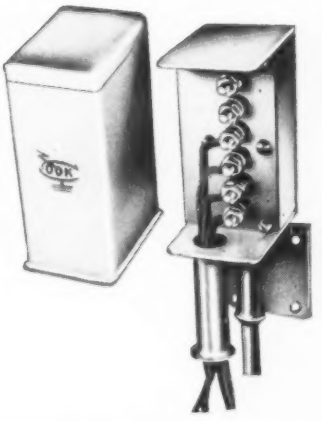
The 3-pair XB Terminal was especially designed to reduce to a minimum all factors that would cause high resistance and the possibility of line leakage and maintenance. Hence the heavy, close-fitting welded zinc cover; the non-corrosive Monel faceplate on which are mounted the highly insulated cable studs; the use of the flanged tube as an entrance for drop wires. This tube can be completely sealed after the drop wires are installed.

The new Cook Terminal measures 7½" high, 3¾" deep and 2½" wide. It is furnished with or without cable stub, to user's specification.



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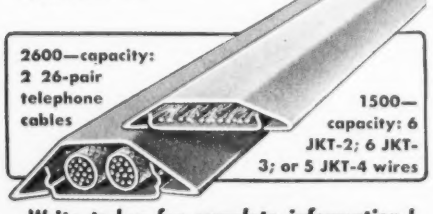

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party residence service in the Halls Lake exchange, including Alderwood Manor, Edmonds, Lynnwood and Mountlake Terrace, would be $5.00 a month. This would permit toll-free calls to Bothell, including Kenmore, Richmond Beach and Emerson and Gladstone exchanges in North Seattle and the general Seattle-rate area exchanges, Mr. Dalton said.

Existing rates are $3.85 a month in Lynnwood and $3.10 in Edmonds and Alderwood Manor for four-party residence service to subscribers with wall-type handsets; and $4.00 and $3.25, respectively, for four-party residence service to subscribers with desk-type handsets.

Similar rates have been requested for the Bothell, Richmond Beach and Kirkland exchanges, all of which would include toll-free calling to contiguous exchanges, including the general Seattle rate area exchanges.

V V

Nebraska Independent Incorporates

The Nebraska Railway Commission on Aug. 3 authorized the transfer of the exchange properties of the Hyannis Central Telephone Co., a co-partnership, to the Hyannis Telephone Co., a corporation.

Under the terms of the transaction, all of the corporate stock in the former company will be transferred to William L. Perrett and Lillian B. Perrett, who were co-owners of the former company.

The purpose of the incorporation is to enable the company to be in a better position to obtain necessary financing for the rehabilitation and modernization of the telephone properties.

V V

Stock Issue Authority Sought By Lincoln T&T

The Lincoln Telephone & Telegraph Co. has applied to the Nebraska Railway Commission for authority to issue and sell 9,623 shares of common stock of the company, $16⅔ par value, at a price of $26 per share.

Subject to commission approval, warrants will be issued to holders of common stock giving them the right to purchase one share of stock for each 19 shares held. Warrants will expire on Nov. 2, 1954.

V V

United of Pennsylvania Asks 10-Cent Paystation Rate

The United Telephone Co. of Pennsylvania, Harrisburg, on Aug. 20 asked authority to raise its public paystation rate from five to 10 cents, beginning Oct. 13.

The company, which serves 62,000 subscribers in 15 counties, told the Pennsylvania Public Utility Commission the proposed rate was in line with that used by the Bell Telephone Co. of Pennsylvania and a number of Independent companies in the state. It said the change would return approximately $15,000 annually in new revenue.

V V

S.C. Independent Gets Go-Ahead On Rate Raise Schedule

The Ninety Six (S. C.) Telephone Co. on July 29 received approval of a rate increase for telephone service from the South Carolina Public Service Commission.

The new rate schedule, effective Aug. 1, follows:

One-party business	$6.00
Two-party business	5.00
Four-party business	4.50
Multi-party rural business	4.50
One-party residence	3.25
Two-party residence	2.65
Four-party residence	2.30
Multi-party rural residence	2.30

The schedule authorized by the order will result in an increase in the company's annual gross revenue by approximately $1,778, and will yield a return of 6.98 per cent on the company's net investment.

The commission held the first hearing on the petition for a rate increase on May 6.

V V

Asks Approval of $1,100,000 Bond Issue in California

Los Gatos Telephone Co. has asked to borrow 1.1 million dollars on 4½ per cent first mortgage bonds from Occidental Life Insurance Co., it was reported on Aug. 20.

In an application to the California Public Utilities Commission seeking permission to issue the 25-year bonds, the company said it would use the proceeds to pay debts and reimburse its treasury.

V V

Wisconsin Company Seeks Authority for Rate Raise

The General Telephone Co. of Wisconsin, Madison, states that increased costs of operations force it to ask the Wisconsin Public Service Commission for authority to increase subscriber rates.

The company, which serves nearly 400 communities in Wisconsin, asked the commission recently to start an investigation on its revenue needs.

The company did not say what increases would be asked, but said it would submit data to support the claim that more income is needed.

SOUTH MEETS EXPANSION

Concluded from page 20

lanta and Jackson, Miss., a total of 2,136 miles of radio relay routes are now in use in Southern Bell territory. Additional routes totaling 1,043 miles are under construction to bring network television and additional long distance service to still more southern cities.

Another indication of southern development is seen in the expansion of Southern Bell's teletypewriter service. The 4,975 stations in service at the end of 1953 represented a gain of 8.3 per cent during the year.

In addition to widespread usage as a means of flashing news stories and weather bureau information, transportation groups, agriculture cooperatives and brokerage houses use this service to transact much of their daily business.

On May 1 this year, the Delta-C&S Air Lines in Atlanta began using a new private line automatic teletypewriter switching system connecting 59 U. S. and six foreign cities. Provided by AT&T Long Lines, the Western Electric Co. and Southern Bell, this new system connects any one, several, or all of the 85 receiving teletype machines through the world's largest single automatic teletypewriter switching center, located in Atlanta.

Mobile radio telephone service is in use in 16 of the South's major cities with surveys underway in seven additional cities to determine requirements for this type of communication service. More than 390,000 calls were made durin 1953 through facilities of the general mobile radio-telephone units. In addition there are 52 private mobile telephone systems and 901 mobile units in service.

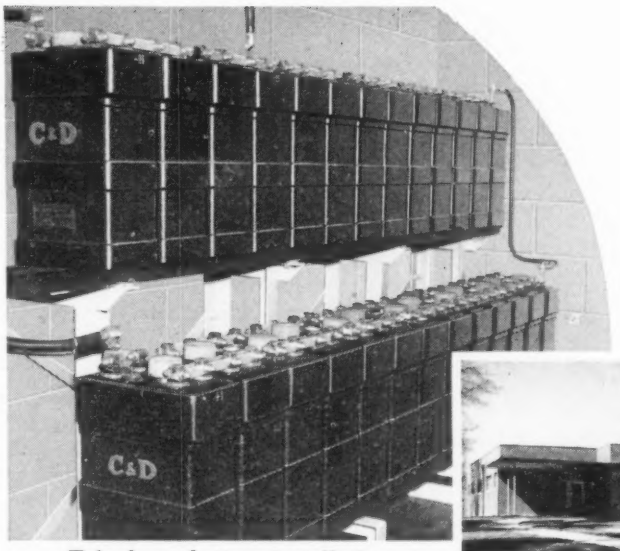
Almost half of the 123,000 ship and aircraft radio telephone calls placed through Southern Bell's long distance facilities in 1953 were handled through the New Orleans station.

The Southern Bell Telephone & Telegraph Co. and the 576 Independent companies serving the Southwest are looking forward to heavy telephone activity throughout the remainder of 1954. This is striking evidence of their confidence that the industrial and economic growth that has caused their nine-state area to surge ahead in recent years will continue.

V V

Name Change for Kansas Co.

It was recently reported that the name of the American Telephone Co., Abilene, Kan., has been changed to the United Telephone Co. of Kansas, Inc.



At The Chester Telephone Company

Telephone battery installation at the Chester Telephone Company, Chester, S. C. The 26 PlastiCal cells, Type RCT-840, have a 840 A.H. capacity.

It's C&D Batteries for EXTRA life

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3. **Elimination of sudden leaks due to internal stresses.**

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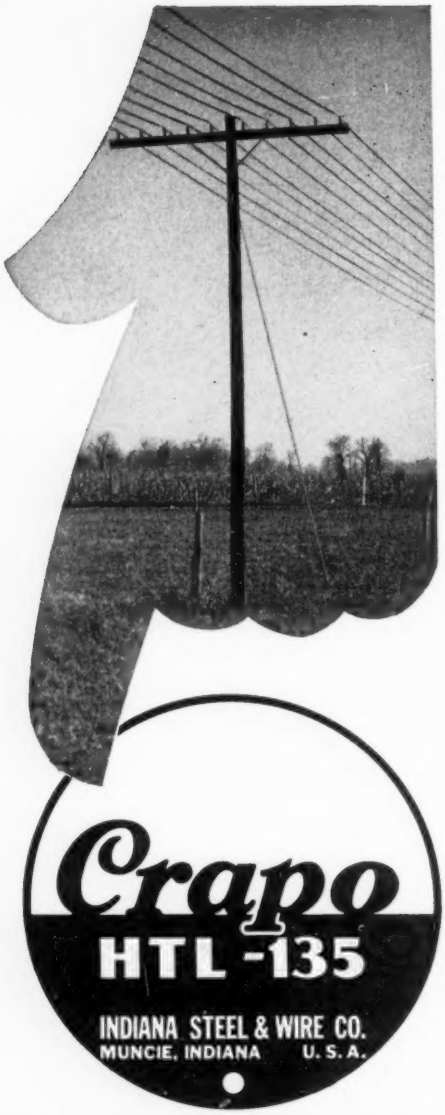

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Continued from page 31

amplified but not the line noise, thus providing a good signal to noise ratio.

Expandor Circuit

At the receiving end of a circuit equipped with a compressor, it is necessary to employ an expandor to "undo" the compressing effect and restore the original volume range of the speakers voice.

Fig. 20 shows an expandor circuit which works with the above compressor.

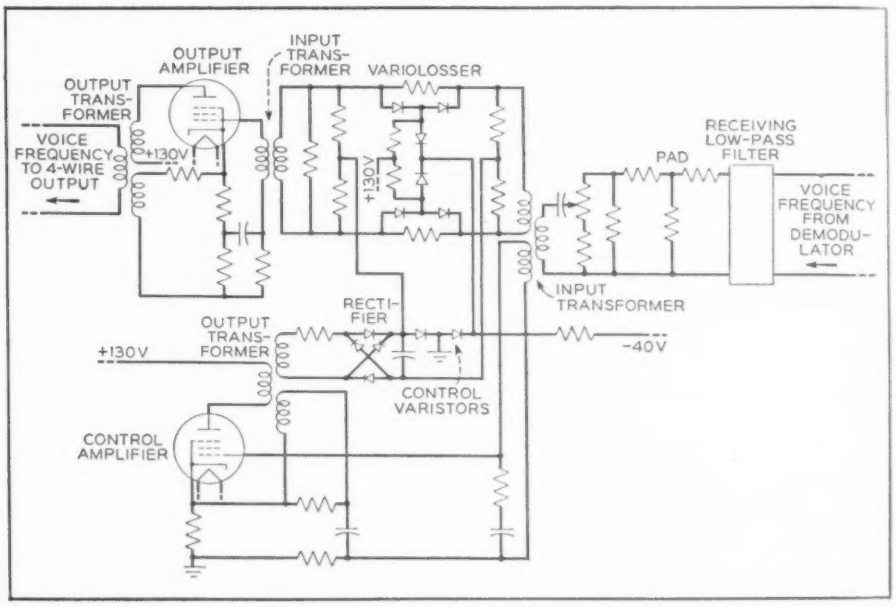

Fig. 20. The variolosser in this expandor circuit has its crystals in series with the voice path, hence, produces an opposite effect from the shunt crystal shown in the compressor. (Drawing courtesy of *Bell System Technical Journal.*)

In this case, the voice comes in at the left from the demodulator, where it has been recovered from the carrier frequency.

From its entrance at the left, the voice again enters a three-winding transformer. Tracing the upper left hand winding of this transformer it will be seen that the voice current will travel through two series resistors in order to reach the grid of the output amplifier tube. Unlike the compressor, these series resistors are high enough in value to greatly cut down the volume of received sound. Whereas the compressor without the variolosser action provided full amplification, the expandor provides low amplification, because of the loss introduced by the series resistors. What voice current is left is amplified in the output tube and sent on through the output transformer to the switchboard.

The expandor action takes place when a portion of the incoming voice current is induced in the lower left hand winding of the three-winding input transformer at the right. This current is amplified by the control amplifier, goes through the control amplifier output transformer, then is rectified. As in the compressor, a condenser provides a timing feature here also, so that the circuit will not respond too fast.

The path of the dc current here is a little more elaborate than in the compressor, but it may be seen that if the left hand vertical wire coming up from the rectifier is positive, it will reach the center tap of the resistors to the left of the variolosser, then divide and travel over the top and bottom horizontal wires between the two input transformers. In doing so, it will also travel through the two horizontal pairs of crystals before reaching the center taps of the resistors, to the right of the variolosser, and back to the rectifier.

In passing through these crystals, the dc again permits the ac voice current to "ride through" with it, thus by-passing the two horizontal resistors which had cut down the volume. By partially shorting out these resistors, the crystals and the dc permit more voice current to pass through to be amplified. Thus this arrangement acts as an automatic volume control for this receiver portion of the carrier.

The amount of dc passed through the circuit is dependent upon the amount of voice current received, because the dc is rectified voice currents. Thus, the voice provides its own control. A loud voice signal will make more dc, which will provide a better path through the variolosser. Thus, the

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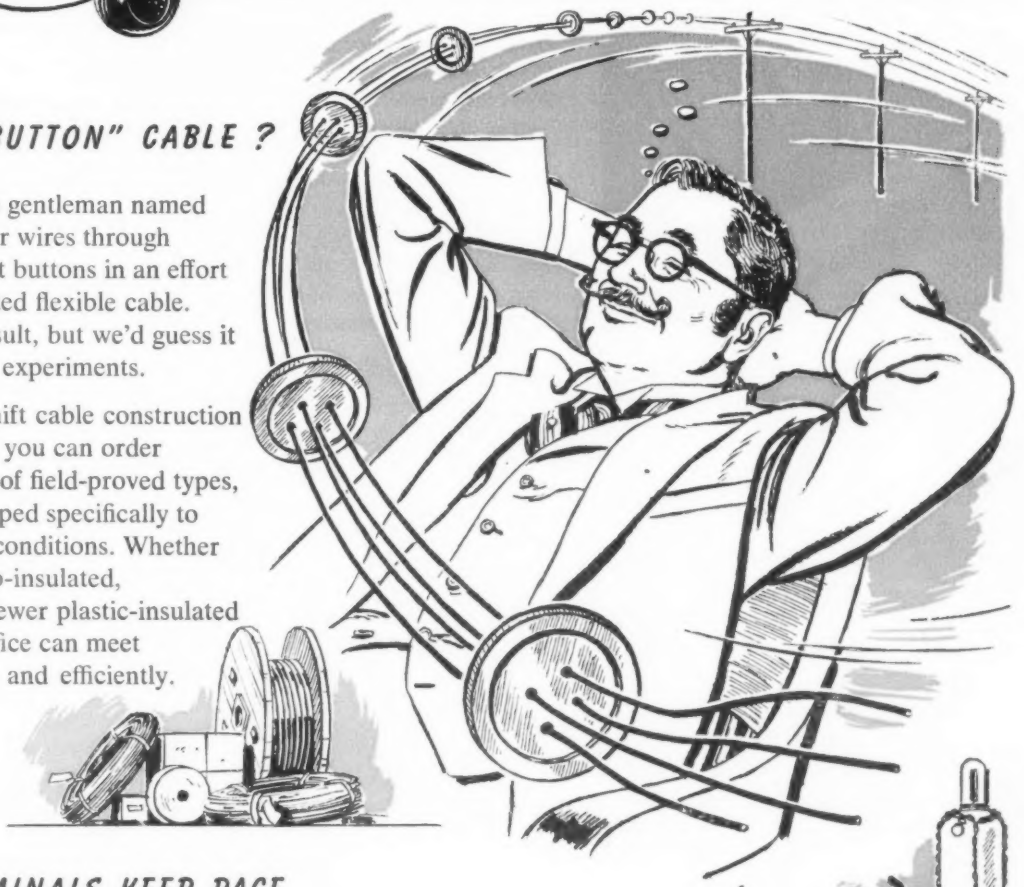

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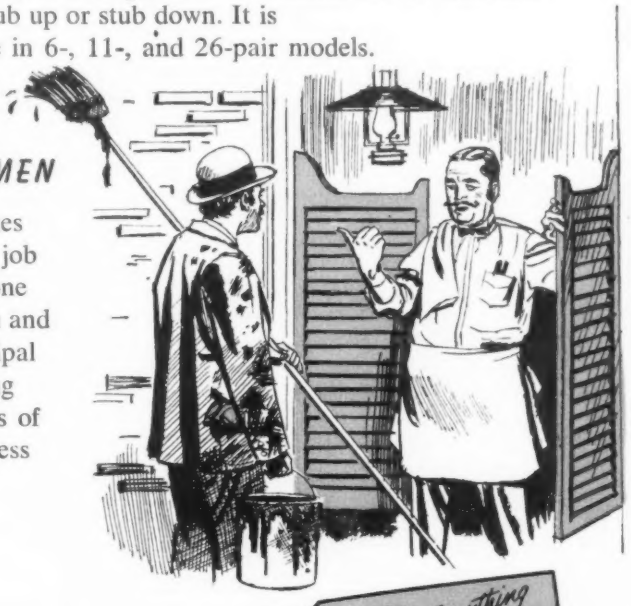

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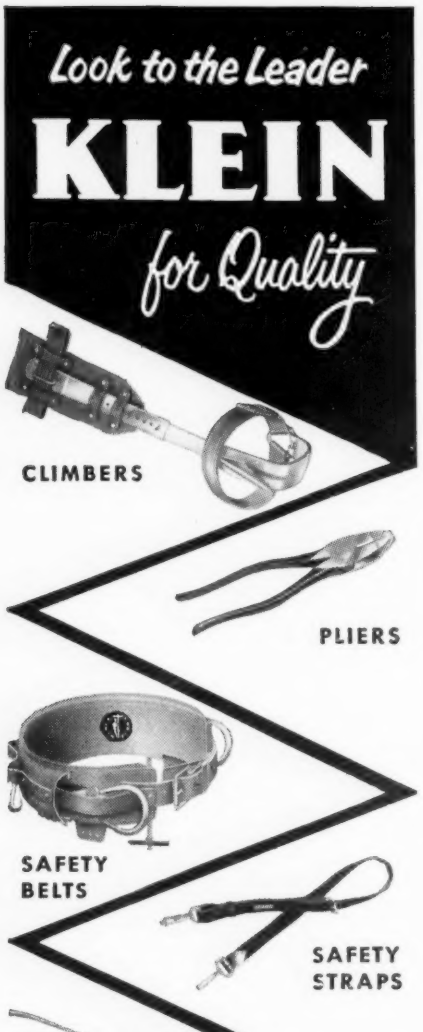

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action is opposite to the compressor—a loud sound is made louder. A soft voice sound will furnish little dc, so the loss caused by the resistors will remain in the circuit—thus the soft sounds are made softer.

Note that the noise which is present on the line is lower in volume than the softest sound, hence it has virtually no effect on the variolosser because it isn't strong enough to provide much dc. Therefore, the noise encounters maximum loss and is submerged to a low volume level.

It may be observed that the principle difference in the wiring of the compressor and the expandor is that in the former, the variolosser crystals are in shunt with the voice path while in the expandor they are in series with it, therefore producing opposite effects.

Crystal Oscillators

In the basic carrier description given at the beginning of these articles, it was shown that the carrier frequency oscillator for a simple low-frequency three-channel system could be a vacuum tube with a coil-condenser combination to cause the oscillations. As the number of channels increases on a system, higher frequencies must be used. Ultimately the point is reached where coil-condenser combinations are no longer satisfactory.

The reason for this is that as the frequency increases, the coils and condensers become smaller in value and less stable. While high frequency oscillators can be built of coils and condensers, they are apt to have their frequencies drift because of temperature changes in the apparatus, aging of tubes and other causes. Hence, for reliable operation in both carrier and radio, quartz crystals are used.

A quartz crystal, among other minerals, exhibits a peculiar effect when electricity is applied to it. Unlike silicon and germanium crystals as used in diodes, the quartz crystal is an insulator, and does not pass any current in either direction. Internally, a quartz crystal mounted for oscillator use consists of a thin plate of quartz with a metal plate or foil on each side of it, to which wires are connected. If a voltage is placed across these two plates, the quartz crystal will actually twist or warp under the electrical strain. The amount of warp is too small to be seen, but the crystal actually distorts under the pressure of the voltage. In fact, if too high a voltage is used, the crystal will distort far enough to break.

When the voltage is removed from the quartz, it will spring back into its original shape. Now, the length of time it takes a quartz crystal to distort or to spring back into shape is directly related to the shape and size of the crystal. Hence, the dimensions of the crystal determine the *frequency*, or number of times a second it can be made to respond.

Quartz crystals can be accurately ground to respond over a wide range of frequencies. When the crystal springs back into place after being distorted, a small voltage is sent back out from it, much like the discharge of a condenser. These properties of the crystal can be utilized in a vacuum tube circuit to produce alternating current oscillations. The dimensions of the crystal only will determine the frequency, and coils and condensers are not necessary for frequency generating purposes.

The crystal oscillator is very stable, being only slightly affected by temperature or voltage changes, and requires no adjustment. This type of oscillator is used in most high frequency applications, including carrier systems.

V V

Glenn L. Wilder Retires After 50 Years in Minnesota Industry

Glenn L. Wilder has retired after 44 years as manager of the Pioneer Telephone Co. of Granite Falls, Minn., it was reported on Aug. 12.

It was on July 7, 1904, that Mr. Wilder went to Granite Falls from Delano, Minn., to work as a lineman for his brother, Roy, manager of the Granite exchange of the now-defunct Minnesota Central company. Mr. Wilder stayed for a year, then went to Olivia to manage the local exchange for Minnesota Central. He returned to Granite on May 10, 1910, to succeed his brother as manager of the newly-organized Granite Falls Telephone Co. and continued in this position 44 years, the only change being that of name when the Pioneer Telephone Co. bought the local exchange three years ago.

While he has given up active management, Mr. Wilder will still serve the Pioneer company when called upon. He expects to do some work in surveying exchanges preparatory to the installation of automatic equipment.

Mr. Wilder's successor has not as yet been named by the Pioneer company.

V V

OBITUARY

WALTER B. MOUL, plant chief for the Corry office of the General Telephone Co. of Pennsylvania, Erie, Pa., died on Aug. 11 in Corry. He had been associated with the company for the past 41 years.

IN THE NATION'S CAPITAL

Continued from page 18

was virtually the Independent telephone industry's own bill, because it exempted them from what might otherwise become a burdensome duplication of regulatory jurisdiction by both state commissions and the FCC. It abolished any claim of FCC jurisdiction on the small Independent intrastate telephone companies regardless of whether or not they use radio facilities.

Next in the order of importance was tax legislation. This took two forms. First, was the abolition of the 25 per cent excise tax on long distance calls and the 15 per cent tax on monthly exchange telephone bills. Instead both of these taxes were reduced to a flat 10 per cent, easing the fiscal burden of the telephone industry as a whole.

Secondly, there was the passage of the general tax revision bill, which contained a number of provisions of direct concern to telephone companies. Without going into repetitious detail, the new tax bill eases depreciation deduction requirements, grants small stockholders some measure of tax relief on dividends paid out of earnings already taxed at the corporate source. It will also, in another year, lower the corporate income tax rate from 52 per cent to 47 per cent—the pre-Korean level—and relieve those affiliated utility companies qualifying for the advantages of a consolidated return from any penalty for the use of such a return. This relief, incidentally, is special for public utilities, including telephone companies. Other corporations using the consolidated return must still pay the 2 per cent penalty.

With respect to appropriations, the Congress gave REA 75 million dollars for new telephone loans—a high point in financing the rural telephone program of REA since its inauguration in 1949.

Negatively speaking, the 83rd Congress failed to raise the statutory minimum of 75 cents an hour in the Wage-Hour Law, although considerable pressure was brought on the administration from labor sources to enact an increase from 75 cents to $1.00 or $1.25 an hour. The United States Independent Telephone Association, as in past years, appeared in opposition to increases at this time. A related proposal to abolish the exemption of small telephone exchanges (in the present Wage-Hour Law) from minimum wage requirements for telephone operators was likewise unacted upon as the session closed.

Also on the negative side, but not favorable to the small telephone companies, was the failure of Congress to raise the exemption (from $300,000 to $500,000) of security issues by small companies from the burdensome registration requirements of the Securities and Exchange Commission.

In the broader field of regulation, Congress finally passed, after much explosions, and fireworks, including Morse's one-man filibuster, the atomic energy bill. This new law ends the federal government's monopoly in the development of federal power and permits privately owned and operated utility companies to obtain licenses for building atomic power plants in the future. In the same bill the federal government was authorized to contract with private companies for electric power to be supplied to TVA—thereby curbing the expansion of federal power monopoly which now exists in the Tennessee Valley.

President Eisenhower's most outstanding, and perhaps most surprising, victory in the 83rd Congress was the farm bill. Contrary to earlier indications, including the forecasts of many leaders of his own party, the White House finally wangled an agriculture bill, containing flexible price supports

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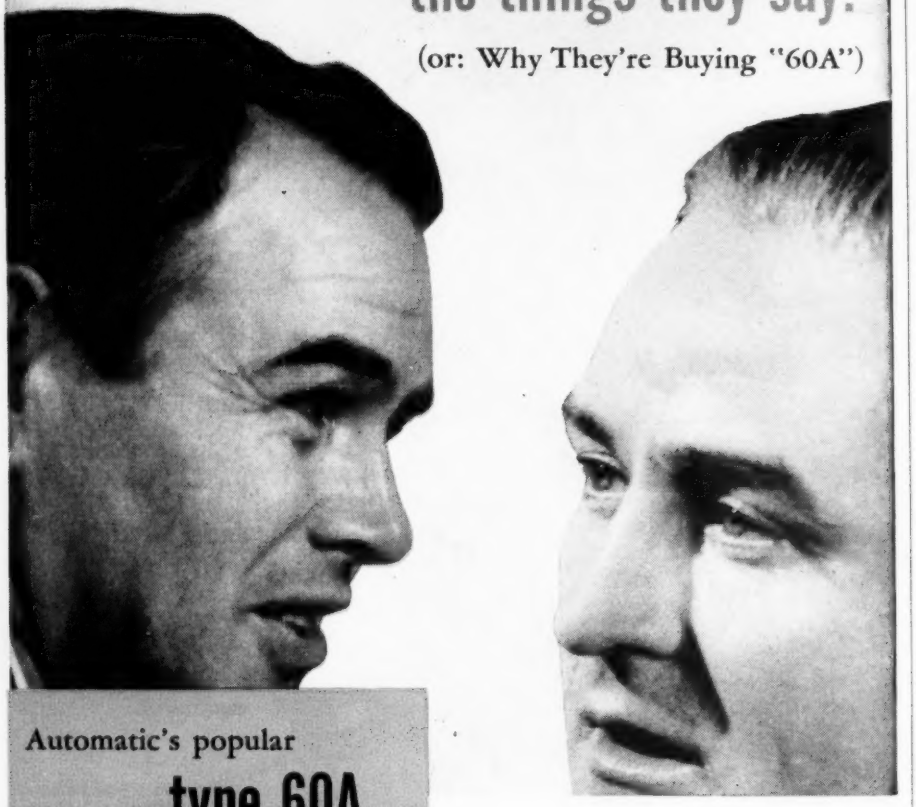

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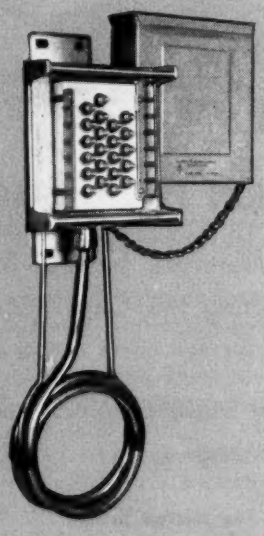

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in contrast with previous rigid price supports which still threaten to drown the taxpayer in surplus butter, wheat, and other commodities, which he must pay for but cannot use.

It is too early to say just how the public will react to these new laws. The farmers may be angry enough about the loss of firm price supports to make it an expensive victory for the Republicans at the next election. Organized labor leaders, who have boycotted the administration almost from the beginning, may turn up with a decisive following at the polls next November. And so on, with other special groups whose toes may have been stepped upon or had their privileges curtailed. These were calculated risks which had to be taken in any legislative program. For better or worse, the bills were passed. Efforts of the opposition to sand the gears and block final voting largely failed. Whether the job was done right or will prove popular remains to be seen. But it certainly was not a do-nothing Congress.

V V

18 of Industry's Rural Leaders To Confer With REA Officials

Eighteen rural telephone leaders from as many states are expected to confer soon with officials of the Rural Electrification Administration on matters of mutual interest to REA and its telephone borrowers, the U. S. Department of Agriculture announced on Aug. 19.

Ancher Nelsen, REA administrator, said exact date of the meeting, to be held in Washington, D. C., has not been scheduled.

The advisory group is composed of the following representatives of the commercial telephone industry and leaders in the rural telephone field:

L. E. Armfield, communications consultant of Fargo, N. D.

Glenn Bergland, manager of Winnebago Cooperative Telephone Association, Thompson, Iowa.

John A. Brady Sr., president of La-Fourche Telephone Co., Larose, La.

Joseph K. Galloway, vice president of The Winter Park (Fla.) Telephone Co.

James L. Capel, president of Champaign (Ill.) County Telephone Co.

Warren B. Clay of Hutchinson, Minn.; president of United States Independent Telephone Association.

Daniel B. Corman, vice president and chief engineer of Northeastern Telephone Co., Inc., Louisville 14, Ky.

Ross Gault, manager of W.E.G. Dial Telephone, Inc., Gardner, Kan.

Walter Harrison, manager of George Electric Membership Corp., Millen, Ga.

William C. Henry of Bellevue, Ohio; chairman of USITA Committee on Problems of Small Companies.

J. Lee Keiger Sr., president of The

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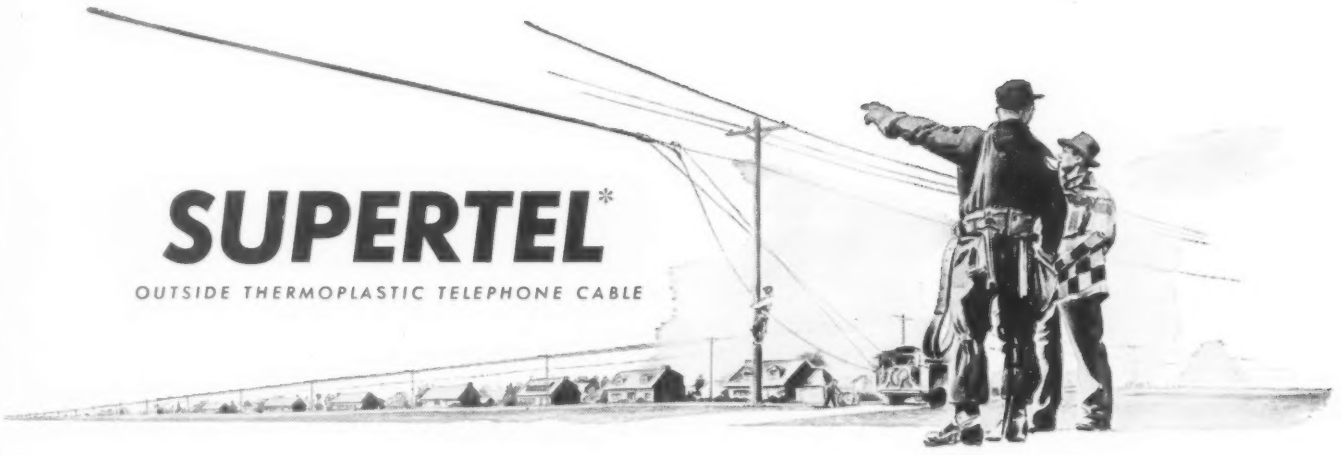

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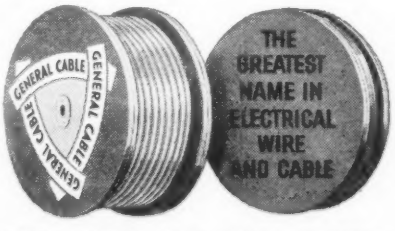

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Orla L. Moody, staff engineer of American Telephone & Telegraph Co., New York, N. Y.

Frank Richmond, manager of Twin Lakes Telephone Cooperative Corp., Gainsboro, Tenn.

Riggs Shepperd, manager of Medina Electric Cooperative, Inc., Hondo, Tex.

Jack E. Smith, manager of Mecklenburg Electric Cooperative, Chase City, Va.

George P. Steinmetz, commissioner, Wisconsin Public Service Commission, Madison, Wis.

C. J. Stover, manager of Skagit Valley Telephone Co., Mt. Vernon, Wash.

C. R. Thiessen, president of Mid-Rivers Telephone Coop., Lambert, Mont.

V V

Ohio Public Utilities to Spend 1.2 Billion Dollars in 1954-55

Ohio Public Utilities Commissioner Ray O. Martin told the American Bar Association Convention in Chicago on Aug. 17 that telephone, gas and electric companies in the past 10 years have increased their Ohio investments by a total of 1 billion 524 million dollars.

Martin said that 1,300,000 new telephone customers have been added in roughly the same period.

Furthermore, Martin commented, one-seventh of all the 1954 national private utility investments would be made in Ohio. He said 1954 and 1955 construction budgets call for expenditures of 600 million dollars per year.

In view of these tremendous increases and their attendant requests for rate boosts, the Toledoan urged the attorneys to cut down on the amount of paper work in utilities cases, pointing out, "Whether you represent an applicant company or a protestant, you should make your respective points brief and clear."

Martin further remarked, "All the exhibits and the testimony offered in each case should be as clear and understandable as you can make them. I dare say that there have been few exhibits submitted or little testimony given which could not have been improved in this respect if a little more time and thought had been spent upon them."

The Ohio commissioner also urged that rate increase requests "should be promptly processed, heard and decided," holding that, "the staff of any commission should never be permitted or ordered to investigate merely for the sake of delaying a final hearing on the issues."

In conclusion, Martin said, "Even though unpleasant at times (a commission) must approach its decisions with an unshakeable resolution to abide by the evidence in the record and the applicable law."

V V

Three Wisconsin Companies Merge With Independent

Three Wisconsin Independents recently were reported as merged with the Weyauwega Telephone Co. The three are:

Fremont Telephone Co., The Rural Telephone Co. and the Poy Sippi Telephone Co.

V V

President Signs Bill Requiring Great Lakes Telephones

President Eisenhower on Aug. 13 signed a bill requiring vessels navigating the Great Lakes to have approved radio-telephone installations, effective Nov. 13 (TELEPHONY, Aug. 7, p. 39).

The bill, making effective a U. S.-Canadian agreement, provides that a ship shall have on board at least one person qualified to operate the radio-telephone.

V V

Ohio Independent Votes Merger With Another Company

Stockholders of the Pandora (O.) Mutual Telephone Co. on Aug. 13 voted overwhelmingly to merge with the Community Telephone Co., Leipsic, O., effective Oct. 1.

The Leipsic stockholders are to vote on the merger some time between now and the merger date and are expected to do the same.

The boards of directors of both utilities have already agreed to the joining of the companies in the interests of better telephone service.

The plan calls for the new company to be known as the Community Telephone Co.

The chief trouble with the Pandora company has been the difficulty of placing long distance telephone calls. Under the new system, the calls will go through Finday into the Ohio Bell Telephone system.

President C. H. Lindau of Pandora told the stockholders that the Pandora system will be rebuilt immediately when the merger takes effect.

V V

Consider Sale of Kan. Company

Stockholders of the Miami County Mutual Telephone Co., Paola, Kan., on Aug. 9 were to have met to consider whether to sell the company and its properties to the Southwestern Bell Telephone Co.

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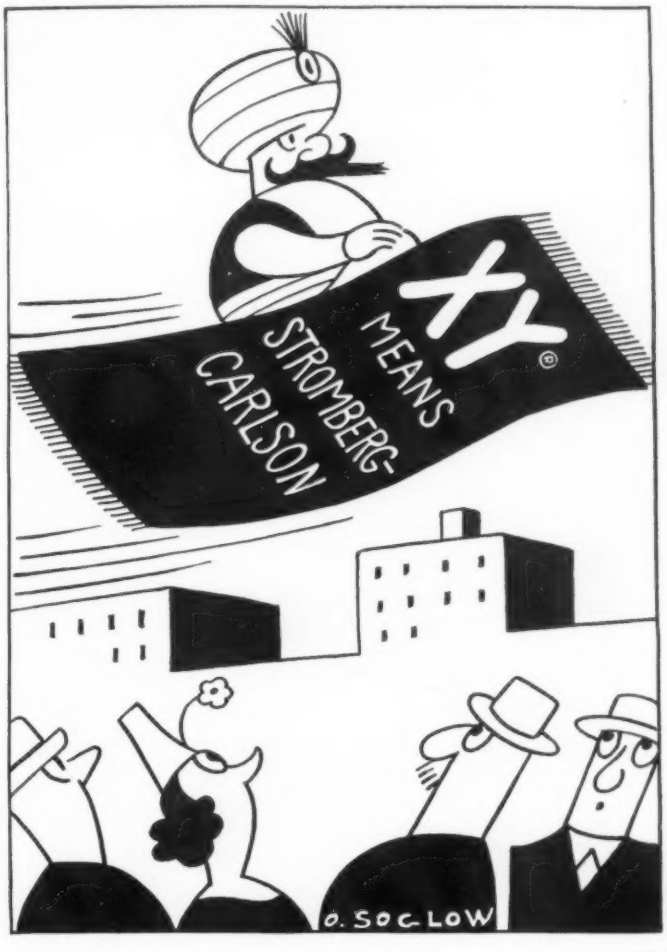

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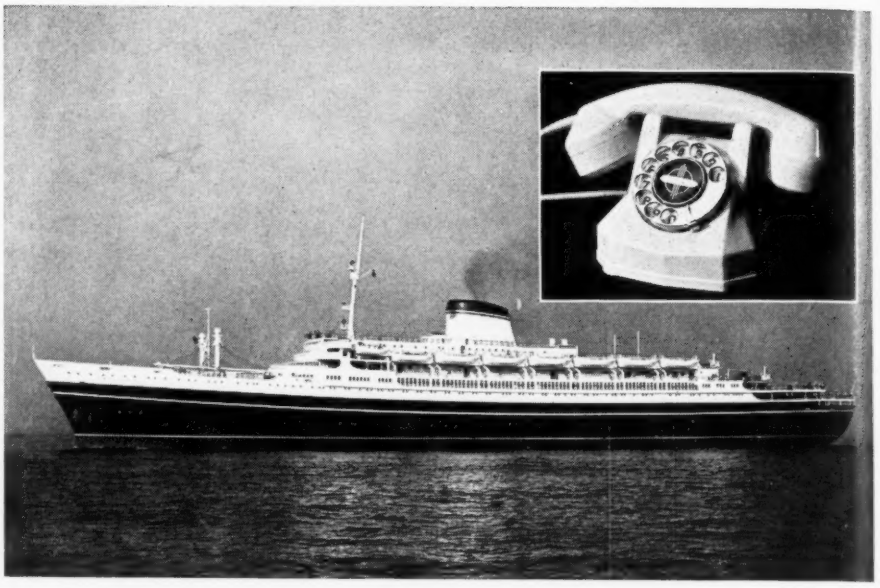

The new Italian passenger liner S.S. Cristoforo Colombo includes among its modern appointments a 300-line Strowger Automatic internal communications system. This system was supplied and installed by Autelco Mediterranea S.A.T.A.P., Italian affiliate of Automatic Electric Co. of Chicago. The inset shows one of the new Autelco handset telephones installed aboard the ship. The Cristoforo Colombo made her maiden Atlantic voyage in mid-July.

Telephone Advertising Man Compiles Book on Writing

The *San Francisco News*, in a column by Dorothy Walker, recently told of a new writing handbook compiled by August Belden, advertising manager of the California Water & Telephone Co., Monrovia, Cal., called "The Wizardry of Words."

Mr. Belden's interest in the power of words began, he says, when, as an advertising man, he started to write copy to sell telephone service to people in rural areas. His paper-bound book sells at $1.00 a copy.

V V

Kellogg Man, G. W. Veith, Celebrates 50th Year on Job

George W. Veith, who joined Kellogg Switchboard & Supply Co., a division of International Telephone & Telegraph Corp., when the company's founder, the late Milo G. Kellogg, was president, celebrated his 50th year on the job Aug. 18. Company officers, headed by President James H. Kellogg, grandson of the founder, entertained the 50-year man at luncheon at the Clearing Club on his anniversary. He was "toasted" by officers and long-time co-workers and presented with a handsome gift.

Now supervisor of switchboard apparatus scheduling, Mr. Veith has spent 40 of his 50 years on the job in the Kellogg production department, specializing in switchboard production. Watching the telephone industry grow from the days of magneto switchboards, when the operator was summoned via "hand crank," to today's modern coast-to-coast dialing system has been a rich experience, Mr. Veith says.

When he joined the Kellogg company in 1904, as a 15-year-old, Mr. Veith recalls, Kellogg development engineers were just turning their attention from

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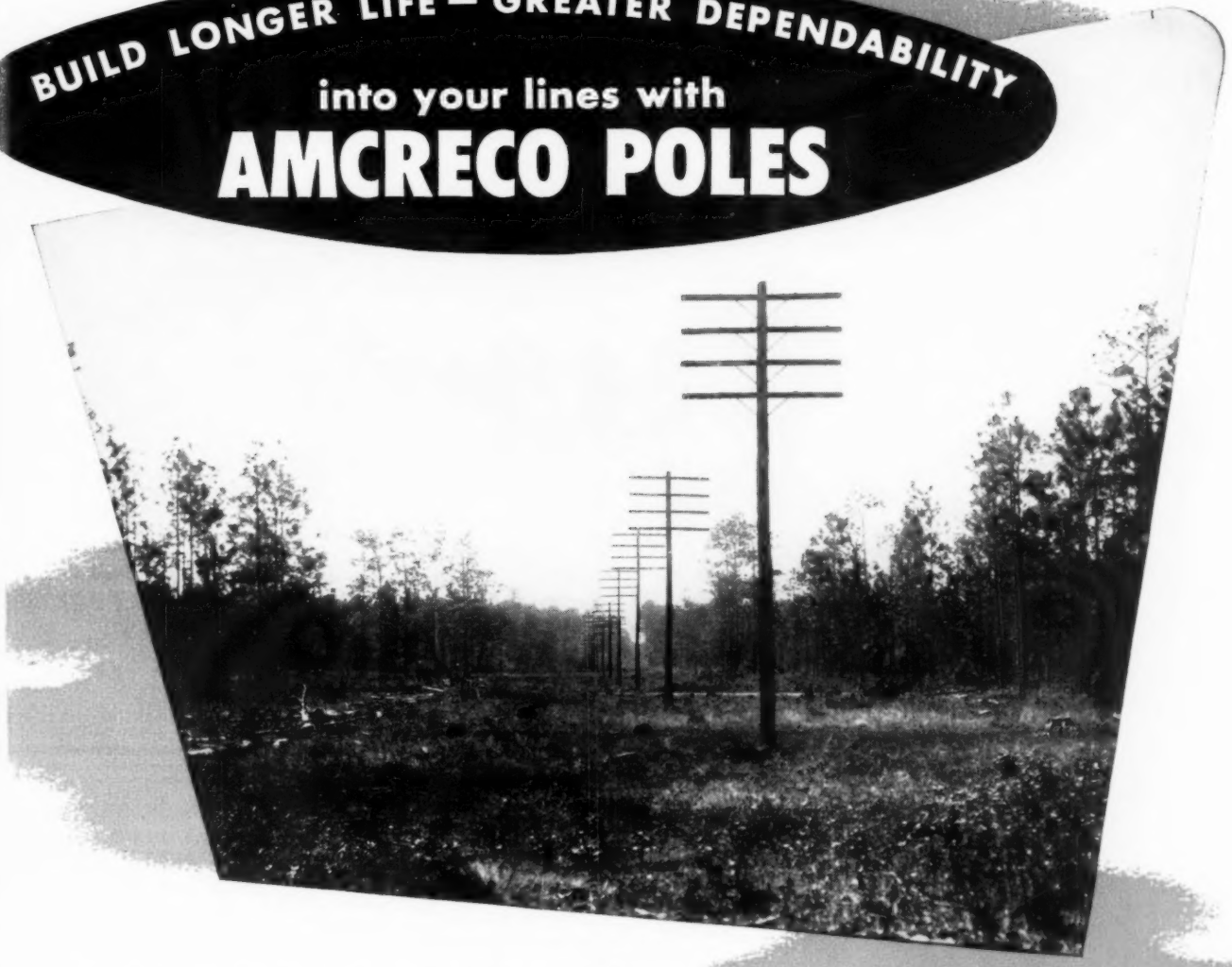

To give you the best telephone pole possible, Amcreco poles are pressure treated in creosote. Not just dipped, not just soaked — but creosoted under pressure by the Amcreco treatment methods. This treatment forces protective creosote right into the cells of the wood — preserves the natural strength of the wood — assures many years of dependable service.

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G. W. VEITH

magneto to common battery switchboards. During his first year with the company, the first American-made cradle-type telephone instrument was introduced by Kellogg. When he started with the company, telephones in use across the country totaled less than 10 million; his 50th anniversary year saw the industry reach the 50 million mark.

Mr. Veith's only extended absence from Kellogg was during World War I, when he saw action in the Argonne with the Fifth Marines Second Division, AEF. Earlier in his career, he served the company for brief periods in Regina, Saskatchewan, Canada, and in Kansas City, Mo.

There was personal romance in the telephone business, too, for the 50-year man. On Feb. 28, 1922, he married a Kellogg co-worker, the former Lillian Andrews. They have two sons, Richard, of Chicago, who saw service with the U. S. Navy in World War II and in Japan during the Korean conflict; and Lt. William, U. S. Air Force, also a World War II veteran, who now is stationed at Mountain Home (Idaho) Air Force Base. The Veiths also have four grandchildren.

V V

Stromberg-Carlson Issues Six-Month Report

In a letter to stockholders dated July 28, Robert C. Tait, president of Stromberg-Carlson Co., reported the results of the company's operations for the first six months of 1954. The report contained comparative statements of income and expense for the six-month period in 1953 and 1954, comparative statements of financial conditions as of June 30, 1953 and 1954, as well as a separate report with respect to the Stromberg-Carlson Credit Corp. All figures are unaudited and unconsolidated.

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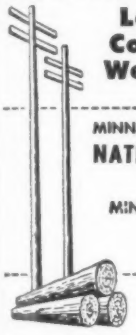
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Stromberg-Carlson's net sales for the first six months of 1954 amounted to $31,928,861, slightly in excess of $31,042,754 reported for the first six months of 1953. Net earnings for the period amounted to $1,177,759, as compared to $1,071,271 for the first six months of last year. After provision for preferred dividends this amounts to $2.26 per share on the 504,183 shares of Stromberg-Carlson common stock now outstanding, as against $2.43 per share on the 420,875 shares outstanding on June 30, 1953.

Mr. Tait explained in his stockholder letter that new financing in March of this year with resultant increases in working capital and net worth are now reflected in the company's balance sheet. These additional funds are enabling Stromberg-Carlson to finance the present volume of business and still permit further expansion. He also pointed out the value to stockholders of having the common stock listed on the New York Stock Exchange. Trading in this stock began on July 6.

Two quarterly dividends of 37½ cents each were declared on Stromberg-Carlson common stock during the first six-month period, payable March 31 and June 30, respectively. The first quarterly dividend of 56¼ cents was declared on the new preferred stock, payable July 1.

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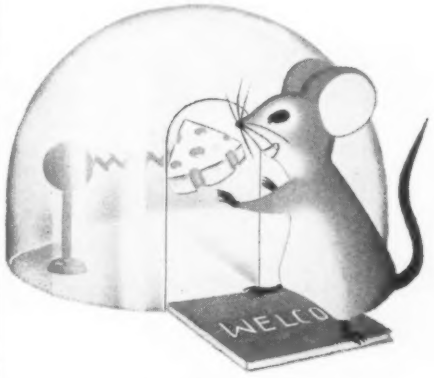

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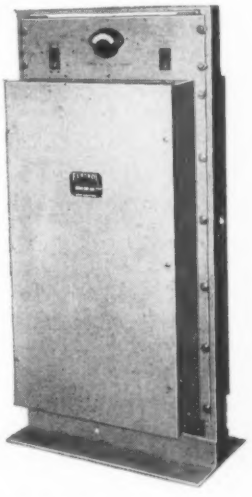
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For complete information, write for Bulletin 160, which describes the single-phase models, from 1/2 ampere to 24 amperes, and Bulletin 161 which covers three-phase models from 25 amperes to 200 amperes.
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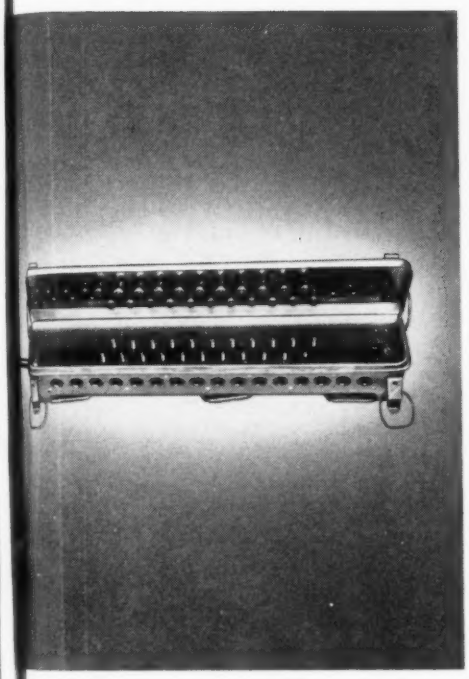

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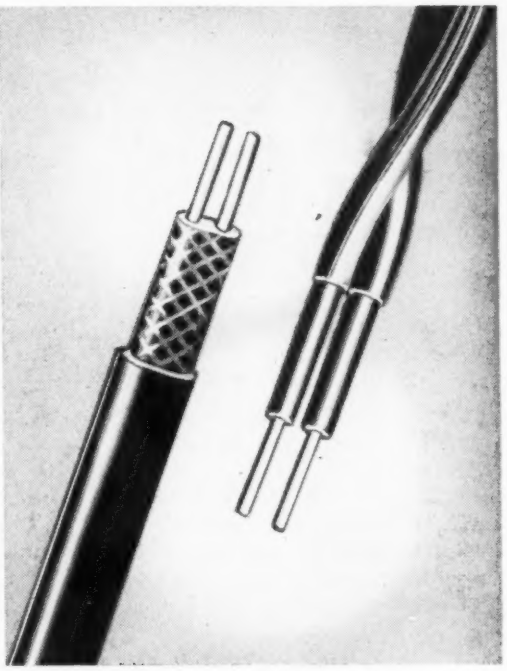

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